modern machine shop

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CUTTER PRODUCTION
See Page 104
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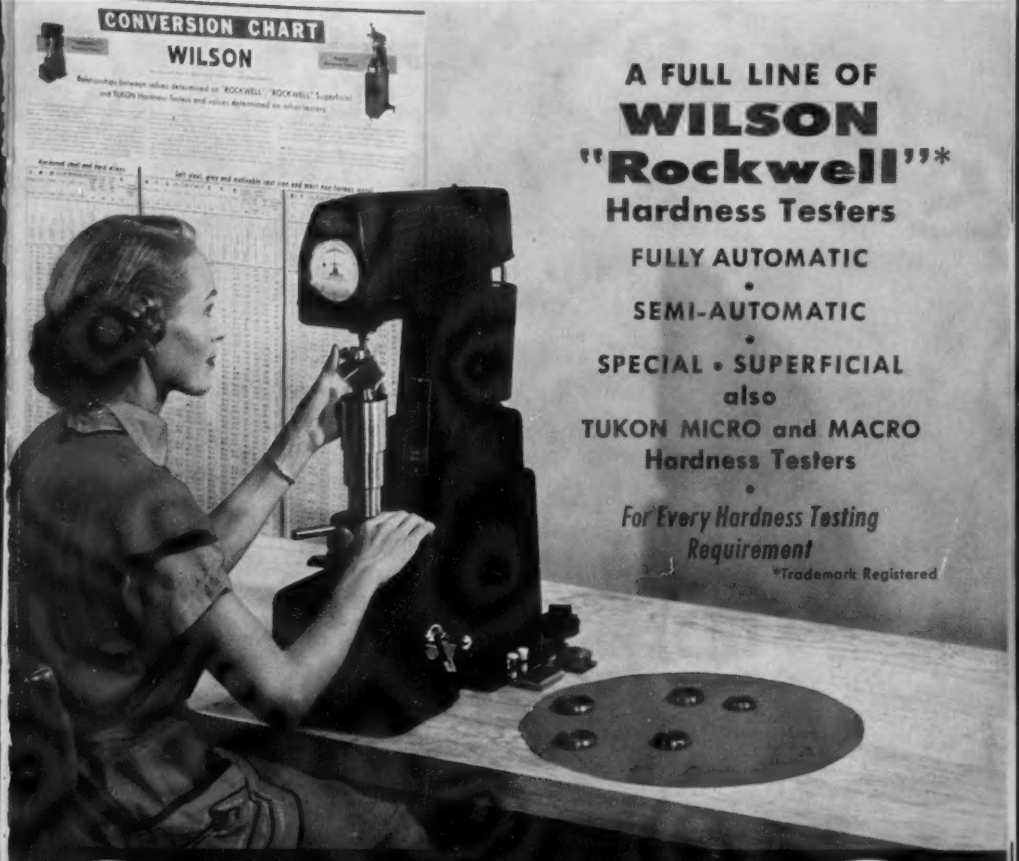
NOVEMBER
1956



A FULL LINE OF
WILSON
"Rockwell"*
Hardness Testers
FULLY AUTOMATIC
•
SEMI-AUTOMATIC
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SPECIAL • SUPERFICIAL
also
TUKON MICRO and MACRO
Hardness Testers
•
For Every Hardness Testing Requirement
*Trademark Registered

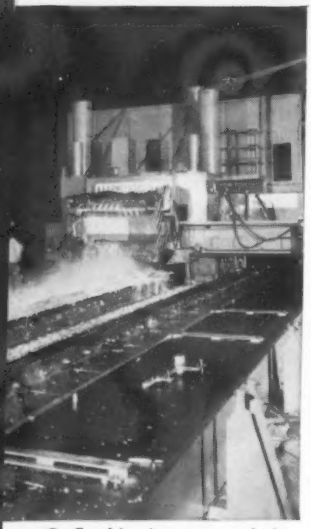
ACCO products

Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE

for Better Value

230-G Park Avenue, New York 17, N. Y.

New Lockheed C-130 Hercules Prop-Jet transports in production at Air Force Plant No. 6, Marietta, Georgia — the world's largest integrated aircraft plant under one roof. It is operated for the U.S. Air Force by Lockheed Aircraft Corporation, which also builds and modifies B-47 jet bombers here. The Hercules is designed to take off in 12 seconds with a 20-ton load. Using unpaved airstrips, it can airlift 64 paratroopers or 92 infantrymen; converts quickly to a 74-litter hospital plane.



● Combination spar and skin miller operating in Lockheed plant. *Texaco Soluble Oil* emulsions are used exclusively in these operations.

How Lockheed keeps production on schedule and reduces costs . . .

To keep its metalworking operations on schedule and its costs in line, Lockheed uses *Texaco Cutting, Grinding and Soluble Oils* at its Marietta plant. For example—

Texaco Soluble Oil emulsions are used on all spar and skin milling operations. The resulting improved performance of the millers (even at cutting speeds above 5,000 s.f.p.m.), the greater cleanliness, the substantially longer tool life—all add up to on-schedule production and lower unit costs.

There is a complete line of *Texaco Cutting, Grinding and Soluble Oils* to help you do all your machining better, faster and at lower cost. A Texaco Lubrication Engineer will gladly help you select the proper ones.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, New York.

TEXACO

TEXACO CUTTING, GRINDING, SOLUBLE AND HYDRAULIC OILS

NOVEMBER
1956
Vol. 29
No. 6

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modern machine shop

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Member
BPA
NBP

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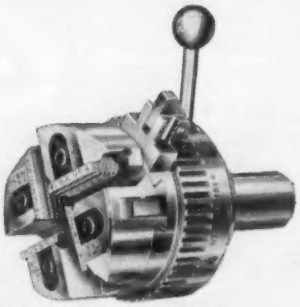
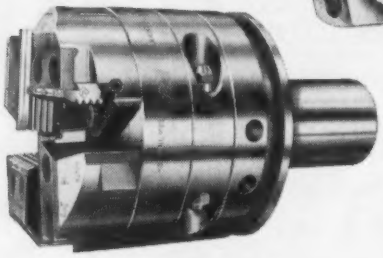
(For more information on cover advertisements, use Reader Service Cards opposite pages 32 and 404.)

2 styles of LANDIS die heads





maximum PRECISION or ECONOMY

"Threading Efficiency" requires the selection of the proper die head for the job to be done. To ensure that you may use the most efficient threading tool, LANDIS manufactures Die Heads in two basic styles:

HARDENED AND GROUND Heads—for a high degree of thread-cutting accuracy (Class 4 and Class 7 tolerances).

HEAT TREATED Heads—for commercial threading (Class 2 and Class 3 fits), with low initial cost and wide range coverage.

LANDIS Tangential Chasers are an important factor both in the economy and precision of these basic head styles—of which there are more than 100 standard and special sizes and types for use on threading machines, turret lathes, tapping machines and bar automatics. Send specifications and ask for Bulletins F-80 and F-90.

LANDIS *Machine* COMPANY

WAYNESBORO • PENNSYLVANIA • U. S. A. 454

For more data circle 201 on Reader Service Card

IT OSCILLATES!
ADJUSTABLE FOR OSCILLATING FREQUENCY AND LENGTH OF STROKE
HAMMOND OSCILLATOR
SPECIALLY DESIGNED FOR USE WITH
NEW ANOCUT ELECTROLYTIC GRINDING PROCESS
• CUTS DIAMOND WHEEL COSTS
• GRINDS FASTER
• SOON PAYS FOR ITSELF

NEW Hammond ELECTROLYTIC OSCILLATING CARBIDE TOOL GRINDER

Write FOR CATALOG

The *New* Hammond Oscillating Carbide Tool Grinder was designed primarily for use with the Anocut Electrolytic Grinding Process. It can also be used for conventional grinding without the Electrolytic "Power Pack".

A controlled and precise method, the Electrolytic process removes stock electro-chemically. It is *not* to be confused with electro-spark or electro-arc methods. It reduces diamond wheel consumption 80 to 90%.

Outstanding feature is the precision, dynamically balanced, OSCILLATING spindle . . . with *variable* oscillations per minute and *variable* length of stroke. The operator no longer oscillates the tool . . . the wheel does the work, with greater speed, smoothness, accuracy, and less physical effort.

Hammond's OF KALAMAZOO "Good Machinery Since '82"

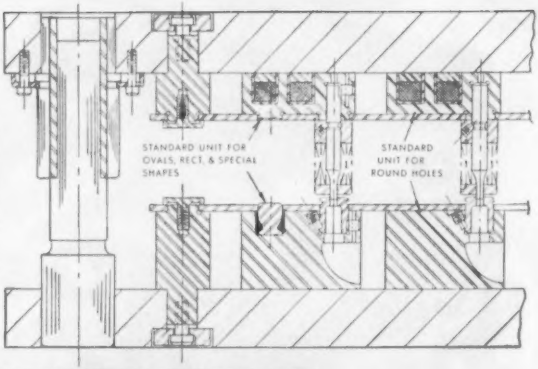
Hammond Machinery Builders INC.

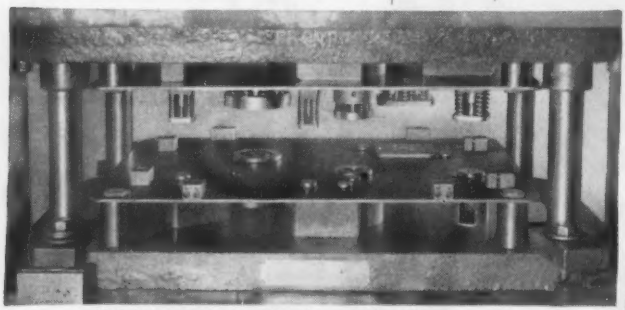
1615 DOUGLAS AVE. • KALAMAZOO, MICHIGAN

For more data circle 202 on Reader Service Card

MAGNETIC DIES
by WHISTLER

• Operate like a single-purpose die • All punch and die parts interchangeable • Pierce metals up to ¼" thick steel • Changes made from one operation to another while the die set is in the press • Change-over time from 5 to 20 minutes, depending upon size of die set • Lower die costs • Saves die storage space • Precision work in any size press • Backed by Whistler's 40 years of die making experience serving the nation's leading plants.





YOU NEED THIS CATALOG... Shows by photos, drawings and prices how the Magnetic Die* system drastically cuts die costs, saves valuable time, speeds production. *Write for it today.*

**Whistler Magnetic Dies are fully patented and are sold under the registered trade name Magna-Die.*

S. B. WHISTLER & SONS, INC.
740 Military Road, Buffalo 23, New York

ADJUSTABLE, MAGNETIC and CUSTOM DIES FOR ALL INDUSTRY

Direct Factory Representatives Located in Principal Industrial Areas

For more data circle **203** on Reader Service Card

Specifications and Major Features of 1 3/8" and 1 5/8" Model AB CLEVELAND DIALMATICS

	1 3/8" Model AB	1 5/8" Model AB
Max. Round Bar	1 3/8"	1 5/8"
Max. Hex. Bar	1 3/16"	1 13/32"
Max. Square Bar	31/32"	1 5/8"
Horsepower	7 1/2	7 1/2
Idle Motion Time	6.3 secs.	6.3 secs.
Stock Feed Stroke	9"	9"
Turning Length	4 7/8"	4 7/8"
Dia. Tool Circle	9"	9"
No. Turret Holes	5	5
Cross Slide Travel	4"	4"
Cross Slide Tooling Width	6 1/16"	6 1/16"

Infinitely variable spindle speeds.
Spindle speed range—40 to 3200 R.P.M.
Cleveland exclusive quick change collet.
Quick change feedshell pads which require no screws.
Variable tool feeds through electric feed drive.
High speed Geneva turret index.
Flame hardened double cross slides.
Quick hand crank stock feed adjustment.
Universal camming and easily adjustable cam drums.

Write for new 1 3/8" and 1 5/8" Model AB Bulletin

gives you maximum productivity with new 1 3/8" and 1 5/8" Model AB

CLEVELAND DIALMATICS

Cleveland brings to metalworking another major advancement in single spindle bar automatic machine design! Now, by making *dial settings* on the control panel, you preselect the *exact* forward and reverse tool feed——and the *exact* forward and reverse spindle speed—for each of five working turret tools. Each tool is completely and individually controlled throughout the cycle . . . *tuned* for maximum cutting efficiency!

There are *no change gears*. Spindle speeds are electronically controlled and infinitely variable between 40 and 3200 r.p.m. You can preselect and set 10 different spindle speeds for each machine cycle. Spindle speed changes and reversals are entirely automatic and are made through electric clutches, which make the number of changes or reversals per minute practically unlimited.

A few of many modern features of these new Clevelands are listed at left. It will pay you to get full information. Get in touch with a Cleveland sales engineer. He'll give you the full story on the many economies these new Clevelands can bring to your plant.

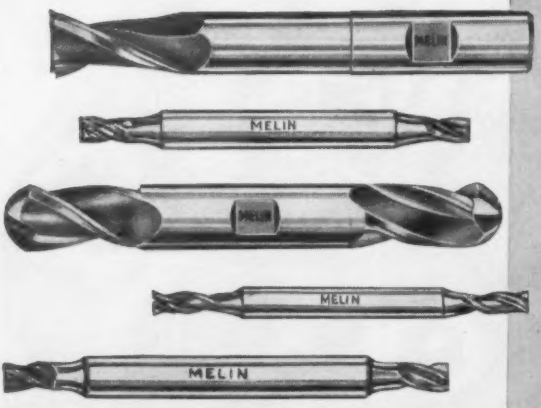
THE CLEVELAND AUTOMATIC MACHINE COMPANY

4940 Beech Street
Cincinnati 12, Ohio

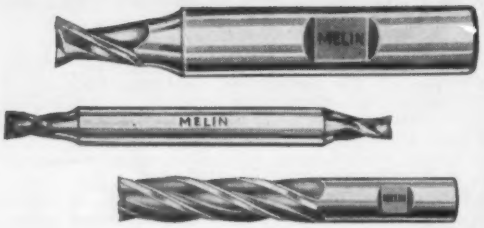
SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • S. ORANGE

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

For more data circle **204** on Reader Service Card



MELIN
END MILLS



There is a difference in end mills . . . MELIN end mills! Proof of this is evident in the continued increase in MELIN popularity. The growth in MELIN tool acceptance was by no means an accident . . . The secret is in *CONSISTENT QUALITY*. This standard of Quality assures you better performance . . . longer lasting performance . . . CONTINUOUSLY . . . from one shipment to another.
Next time you order end mills . . . specify the finest . . . specify MELIN.

MANUFACTURED IN TWO, THREE AND FOUR FLUTE TYPES.

Representatives in principal cities.

MELIN TOOL COMPANY, INC.

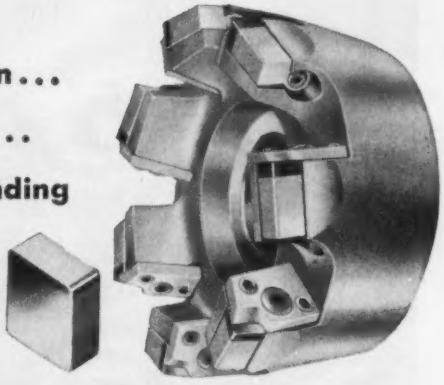
3373 West 140th Street
Cleveland 11, Ohio

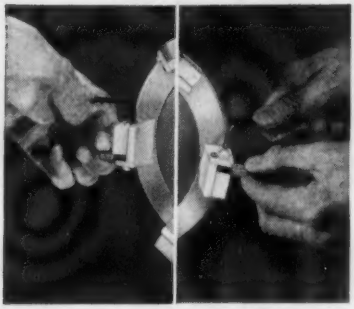
For more data circle 205 on Reader Service Card

NEW V-R FACE MILL CUTTERS

with throw-away carbide inserts

- **Save downtime...**
- **Reduce lost production...**
- **Reduce carbide costs...**
- **Eliminate carbide grinding**





Simply index or replace inserts . . . that's all there is to it!

. . . a single main screw controls the elevator which clamps the insert against the chipbreaker plate. A recessed socket in each end of the screw simplifies indexing regardless of position of the cutter.

Inserts are Inexpensive... Lost Production is Costly

You do not remove the cutter body when cutting edges are worn in V-R's rugged new all-purpose Face Mill Cutter. Precision ground square V-R carbide throw-away inserts index perfectly just by slipping them in position and tightening the main screw. When using a negative rake cutter, you get eight cutting edges on every insert. When the inexpensive inserts are used up, throw them away and replace with new ones.

V-R Face Mill Cutters reduce downtime, completely *eliminate carbide grinding* and save money. They are available in 4″, 6″, 8″ and 10″ standard sizes. Other sizes available to meet your requirements.

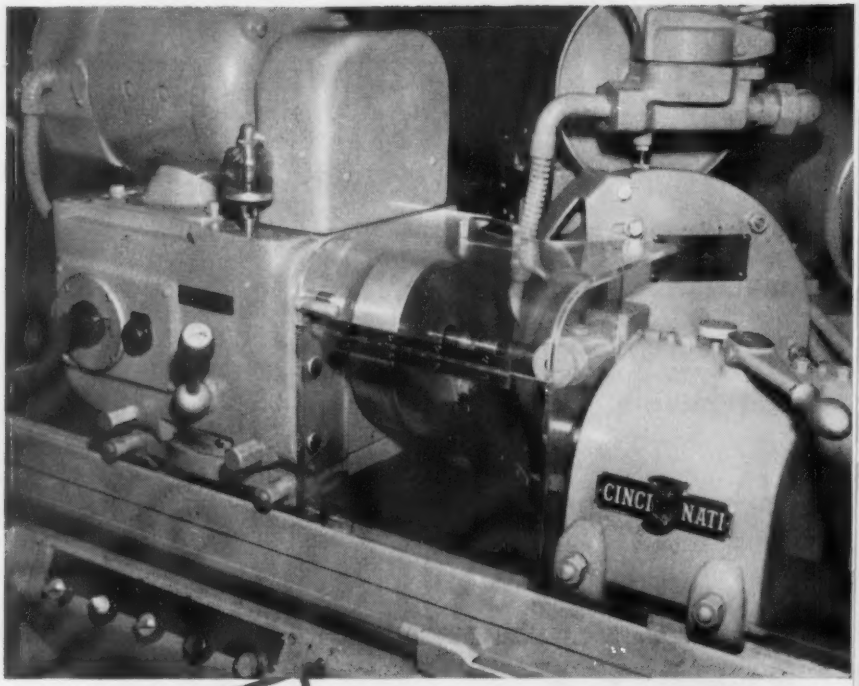
Ask for new Bulletin for complete information.

VASCOLOY-RAMET CORPORATION

860 Market St. • Waukegan, Illinois

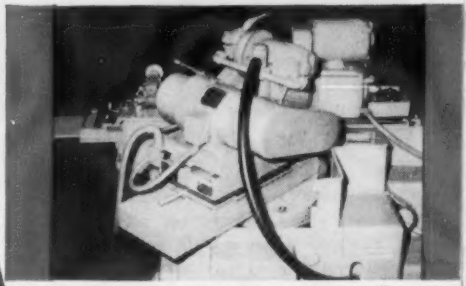
V-R REPRESENTATIVES AND DISTRIBUTORS LOCATED IN PRINCIPAL CITIES

For more data circle 206 on Reader Service Card



CINCINNATI FILMATIC 10" UNIVERSAL GRINDER set up to grind simultaneously diameter and shoulder of titanium trip dogs. Wheel runs at 5000 fpm for these titanium parts.

FILMATIC



Double end motor and standard wheelhead swivel are shown to advantage in this view.

CINCIN

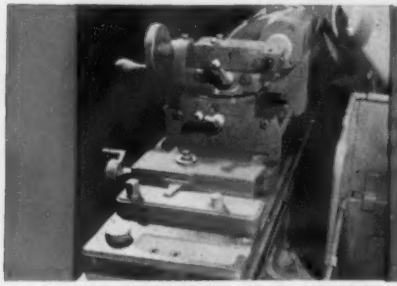
CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES

This Universal Grinder Gives You Both

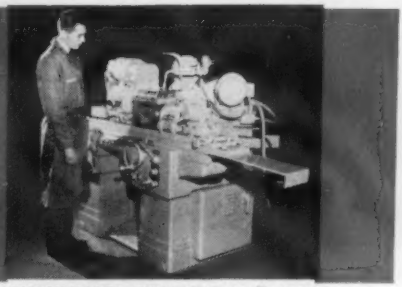
Versatility and Production

Can your universal grinders handle an occasional high production job at a reasonable cost? It's routine work for the CINCINNATI® FILMATIC 10" Universal illustrated here . . . grinding the diameter and shoulder on large quantities of small titanium parts. ¶ To obtain the highest quality finish on the two surfaces, the grinding wheel has been transferred to the right-hand end of the spindle, and the wheelhead swiveled about 45°. Automatic infeed aids the operator in maintaining a uniformly high rate of production. An angular truing fixture simplifies the truing and dressing chore. The 10" Universal's extra measure of power is a big factor in production, too. And in addition, the wheelhead swivels 180° and 220°, upper and lower, respectively; headstock swivels 180°; headstock speeds are infinitely variable 60 to 600 rpm. Sounds good for your shop, doesn't it? Sweet's Machine Tool File contains brief specs.; for complete data, write for our catalog No. G-577-5.

CINCINNATI GRINDERS INCORPORATED, CINCINNATI 9, OHIO



Angular wheel truing attachment for truing and dressing two grinding surfaces on wheel.



CINCINNATI FILMATIC 10" Universal Grinding Machine. Complete information in catalog No. G-577-5.

NATI

CINCINNATI

CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

For more data circle 208 on Reader Service Card

"THE BURGMASTER automatic hydraulic turret drill at The Diamond Chain Company plant has proven very satisfactory. The ease of selecting and setting the available wide range of speeds, feeds and stroke length of each turret spindle makes the machine very adaptable for center drilling, countersinking, drilling and tapping set-screw holes in steel sprocket hubs. Tool breakage has been reduced through the use of Burg tool holders, tapping heads and the adjustable hydraulic feeding pressure."

This experience is far from unique. If you are not now experiencing the improved quality of work and production savings possible with the BURGMASTER, *write now for descriptive literature covering all models.*

For complete information, write Dept. MM-11.

BURG TOOL
Manufacturing Company, Inc.
15001 S. Figueroa St., Gardena, Calif.

Sales Offices:
RIDGEWOOD, N.J.: Burgmaster Eastern Sales Div., 86 N. Maple Ave., GIlbert 4-3002
CHICAGO: Burgmaster Machinery Co. 5329 Lincoln Ave., UPtown 8-7161
SAN FRANCISCO BAY AREA: Paul A. Kulju 857 Estabrook Street, San Leandro, Calif. LOckhaven 9-2244

For more data circle 209 on Reader Service Card

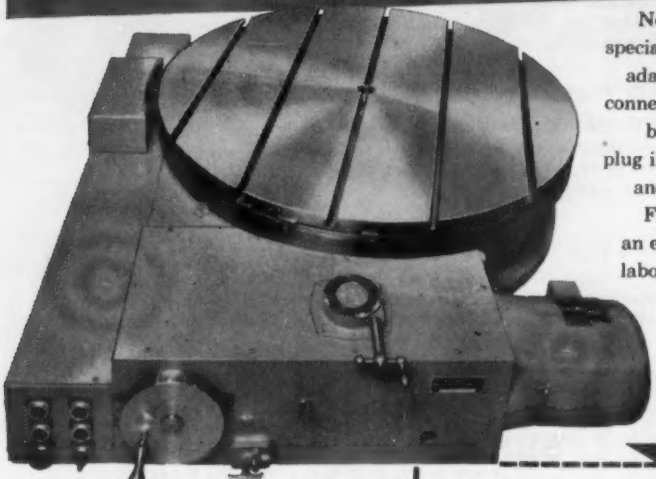
Do ALL These Jobs On ANY Milling Or Boring Machine:

20" MODEL
18 feed changes—
1½" to 52" or 3" to 108"

- ✓ Rotary Milling and Indexing
- ✓ Automatic Cycle Milling
- ✓ Continuous Face Milling
- ✓ Cam Milling
- ✓ Automatic Positioning
- ✓ Revolving Fixture Operations

with KNIGHT'S POWER FEED Rotary Tables

(Completely Self-Contained & Motor Driven)



No setup time—no special equipment or adaptors—no feed connection to milling or boring machine! Just plug into electric outlet and it's ready for work. Fast and accurate—an exceptional time and labor saver! Mail coupon for catalog.

ATTACH TO COMPANY LETTERHEAD

KNIGHT VERSATILE ACCURATE RIGID

24" - 42" - 48" - 60" MODELS
Infinitely variable feed.

See our brief catalog in Sweets

W. B. KNIGHT MACHINERY CO.
3922 WEST PINE BLVD. • ST. LOUIS 8, MO.

W. B. KNIGHT MACHINERY CO.
3922 W. Pine Blvd., St. Louis 8, Mo.

Send information of Power-Feed Rotary Tables.

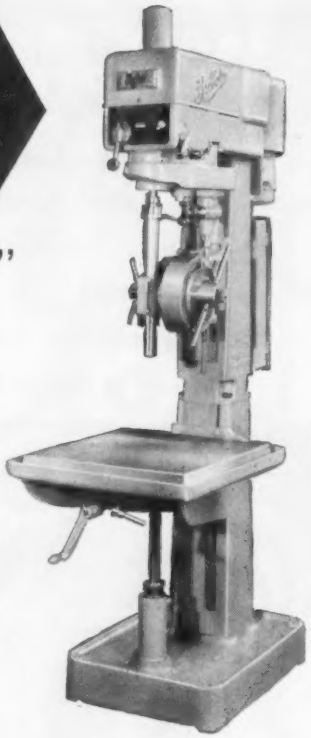
NAME .....

TITLE .....

☐ Also send details on Knight Milling Machines

For more data circle 210 on Reader Service Card

far more than a drillpress!



Here's what the new "RPMster" offers you:

1. ***Unequalled smoothness***

   The unique new gearless drive and balanced, carefully fitted parts in the new "RPMster" provide vibrationless operation at all speeds.

2. ***Wide speed-range changed in seconds!***

   Any low range spindle speed between 100 and 550 R.P.M. INSTANTLY—and by shifting to high range, any speed from 300 to 3000 R.P.M., INSTANTLY. Here is time-saving versatility for the full range of drilling, reaming and tapping operations.

3. ***"Buffalo" Q Factor* Features***

   These include the famous "Buffalo" precision-built spindle—easy action table raising screw —precision power feed—all features that contribute to better, easier work and more of it!

OPERATE THE NEW "RPMster" AND SEE!

Your "Buffalo" Machine Tool Dealer will be happy to arrange a demonstration. We guarantee, you won't want to be without the smooth productivity this machine offers you!

** The "Q" Factor—the built-in Quality which provides trouble-free satisfaction and long life.*

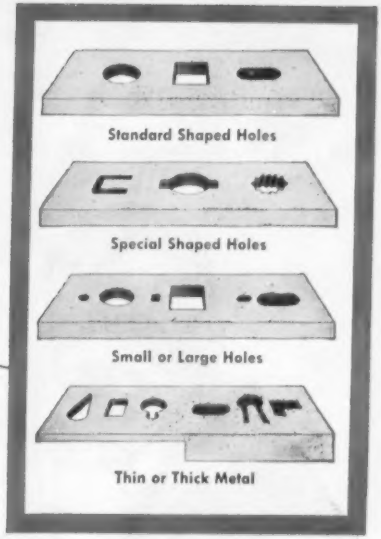
ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

BUFFALO FORGE COMPANY
MACHINE TOOL DIVISION
388 Broadway Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING • PUNCHING • SHEARING • BENDING

For more data circle 211 on Reader Service Card

WHEN R-B Punches Are Used



What are your piercing or forming requirements—standard or unusual shapes—small or large holes—steel or special alloys—thin or thick metals? Many hole-making applications, formerly requiring drilling or some other costly means, can now be done with R-B interchangeable punches. If you have thought your piercing jobs too tough for interchangeable punches, it will pay you to investigate the wide application potential of R-B standardized equipment.

No other manufacturer of punches and die buttons can offer you the amount of successful application experience and the scope of knowledge that is available from the R-B engineering staff for:

★ Cutting Your Production Costs

★ Reducing Die Designing Time

★ Increasing Productivity of Presses

★ Supplying Answers to Piercing Problems

★ Saving Die Construction Time

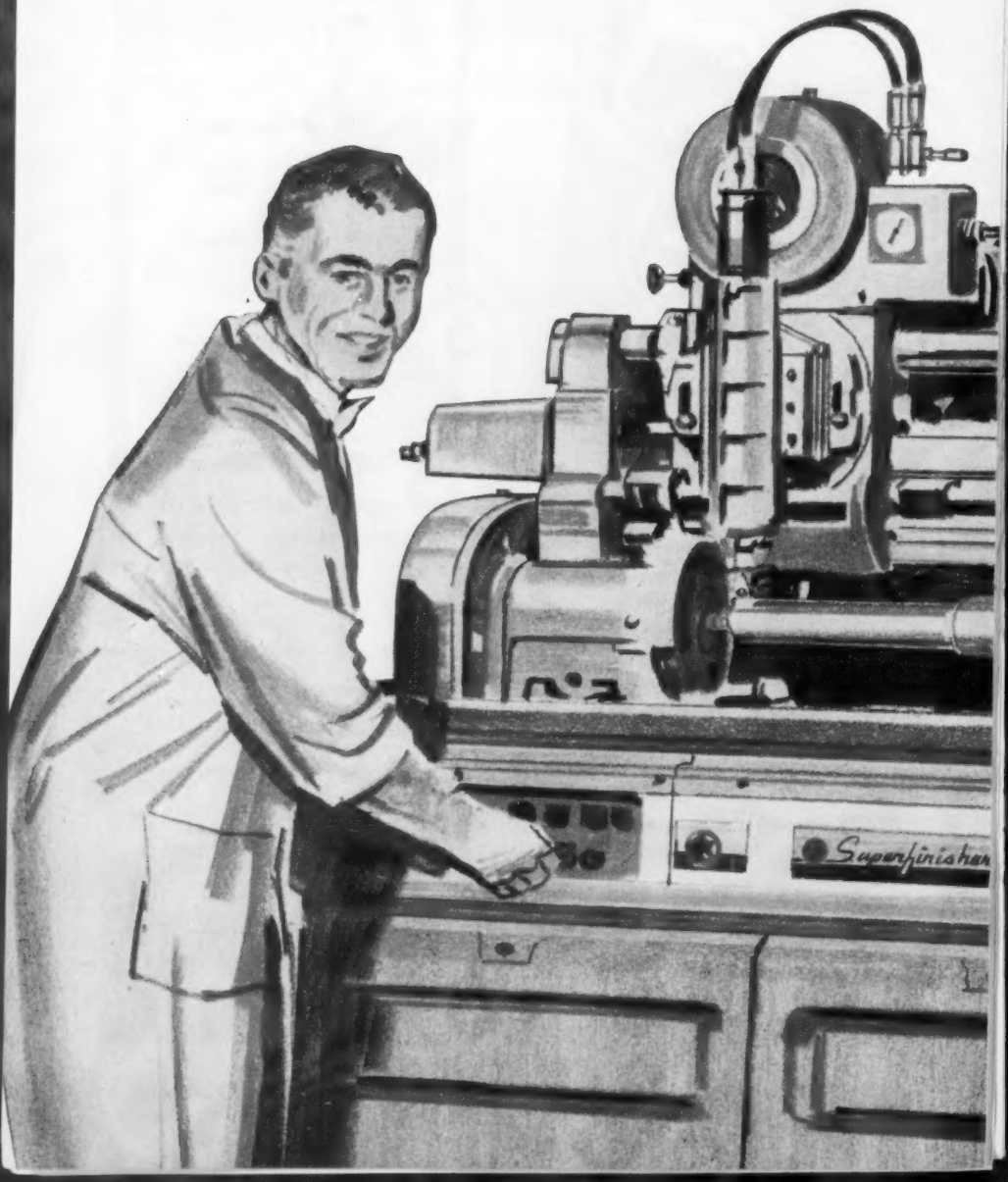
★ Complete Standardization of Press Tooling

For Additional Information or Engineering Service, Write to:

RICHARD BROTHERS PUNCH DIVISION
ALLIED PRODUCTS CORPORATION
DEPT. 86 • 26486 CAPITOL AVENUE • DETROIT 39, MICHIGAN

For more data circle **212** on Reader Service Card

GISHOLT MASTERLINE
52A SUPERFINISHER



The Superfinishing process is recognized as one of the most important contributions to modern metalworking. Now—in this new 52A MASTERLINE Superfinisher—Gisholt offers an outstanding machine for either small job-lot work or high production runs. Other general purpose and high production models complete the line. Let us give you the complete facts on how Superfinishing may be profitably applied to your manufacturing processes—plus full details on the complete line of Gisholt Superfinishing Machines.

Gisholt Machine Company, Madison 10, Wisconsin
Look ahead—keep ahead—with Gisholt

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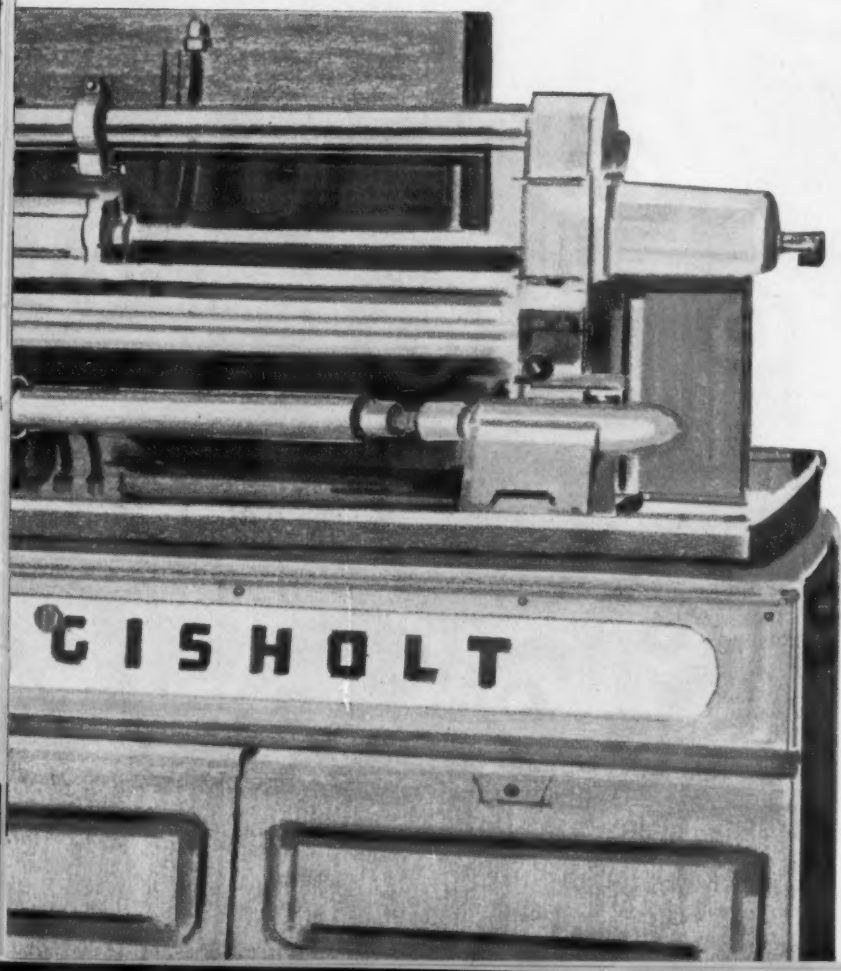
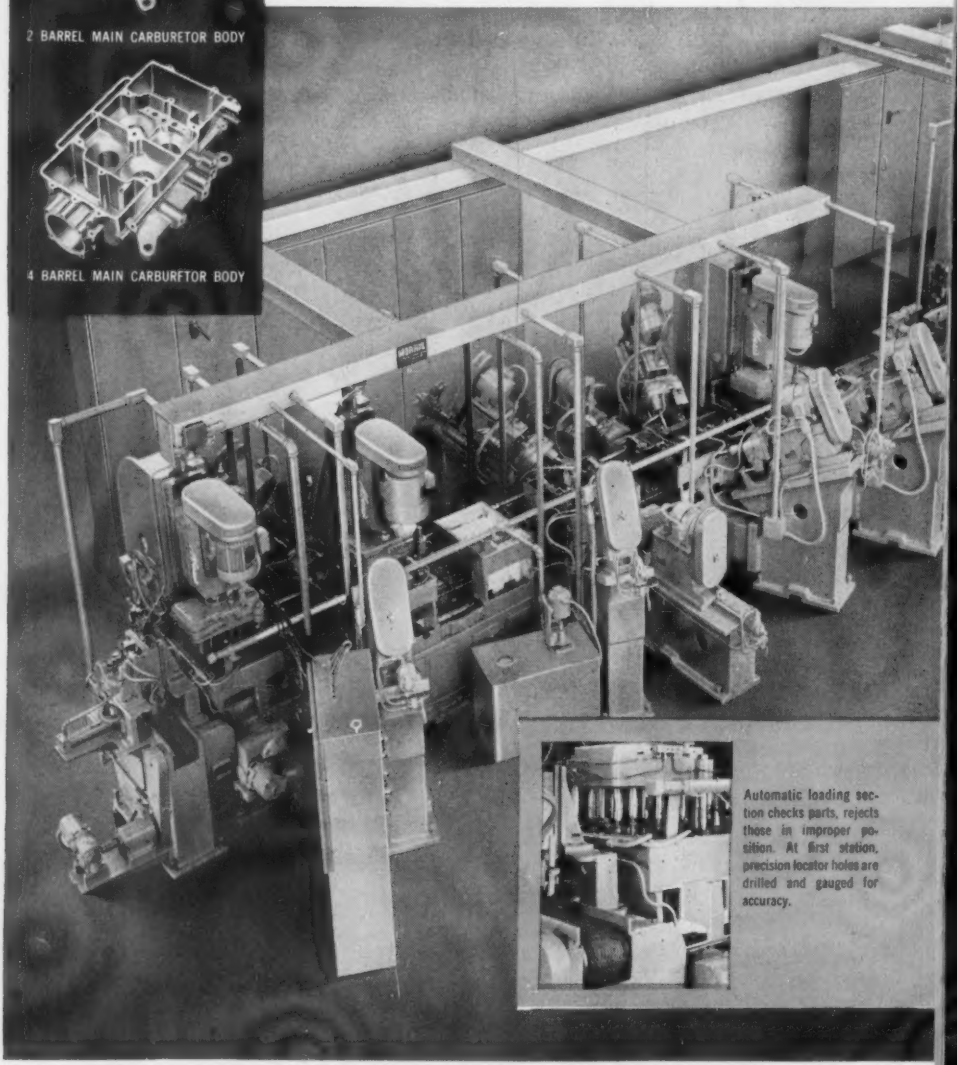


one part completed every

2 BARREL MAIN CARBURETOR BODY

4 BARREL MAIN CARBURFTOR BODY



Automatic loading section checks parts, rejects those in improper position. At first station, precision locator holes are drilled and gauged for accuracy.

7½ seconds!

new Morris

IN LINE TRANSFER TYPE

HIGH PRODUCTION MACHINE

480 parts/hour
56 stations
90 operations

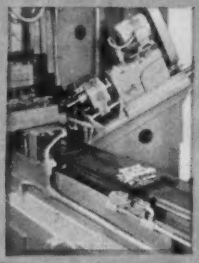
31 DRILLING
19 BORING
10 REAMING
4 GAUGING
13 PROBING
13 TAPPING

Fast . . . flexible . . . high speed production of 2- and 4-barrel carburetor bodies is completely automatic on this new MORRIS machine, designed for a major automotive manufacturer.

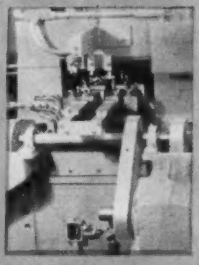
MORRIS designs, engineers and manufactures high production machines, using basic units and automatic drilling units . . . to provide a "special" machine at a fraction of the usual "special machine" price.

Write, outlining your production problem, or send samples of your parts for analysis by MORRIS engineers.

THE MORRIS MACHINE TOOL CO.
934 HARRIET STREET
CINCINNATI 3, OHIO



First and second sections may be operated individually or as a single unit. This center section provides automatic unloading and loading as required. Automatic storage may be provided.



Automatic delivery of parts to unloading conveyor (not shown) after machining. Note precision locating pins in fixtures.

For more data circle **215** on Reader Service Card

MAGNESIUM for low cost tooling

DOW

MAGNESIUM *machinability beats tight schedules*

Machinability and handling ease are two reasons Carr Lane moves jobs faster, at lower cost, with magnesium tooling plate

When a job has to be completed in a hurry, which is often the case at Carr Lane Manufacturing Company, St. Louis, there are big advantages in using magnesium tooling plate.

FASTER MACHINING. Production operations go faster because magnesium jigs and fixtures are easy to machine, easy to weld. Excellent dimensional stability and precision flatness help to hold the closest tolerances. These properties also help to save many hours in the process. On the fixture illustrated, it would take twice as long to do the job in aluminum—and ten times as long in steel.

FASTER HANDLING. The light weight of magnesium, two-thirds that of aluminum, permits pieces to be handled and moved from one operation to another with a minimum of time, effort and equipment. This is particularly important with large jigs and fixtures which couldn't be handled manually if they were made of steel.

FASTER AVAILABILITY. You can get magnesium tooling plate when you want it and how you want it. Whether production deadlines are tight or not, it's always readily obtainable in any standard size and gauge from stock. Contact your nearest supplier of Dow Magnesium or write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. MA 372M.

Available from stock at . . .

Copper and Brass Sales, Inc., Detroit, Mich. • Fullerton Steel and Wire Co., Chicago, Ill. • Hubbell Metals Inc., St. Louis, Mo. A. R. Purdy Co., Inc., Lyndhurst, N. J. • Reliance Magnesium Co., Los Angeles, Calif. • Vinson Steel and Aluminum Co., Dallas, Texas.

you can depend on DOW MAGNESIUM DOW

For more data circle **218** on Reader Service Card

best on every point

... and among high speed steels the top performer is REX

To leap the hurdle of competition, a product needs performance born of quality. And Crucible's REX® high speed steel has it – in accurate size . . . sound uniform structure . . . dependable response to heat treatment . . . optimum tool performance.

Now, thanks to improved manufacturing techniques, REX is even better – more uniform. Put it to work on your next job, and you'll quickly know why REX is today, as it has always been – *the standard by which all other high speed steels are compared.*

Call for REX at your local Crucible warehouse. Or order it directly for prompt mill delivery. And for a list of available data on REX and other Crucible *special steels,* write now for a free copy of the "Crucible Publication Catalog." *Crucible Steel Company of America, Chamber of Commerce Bldg., 7th Ave. and Smithfield St., Pittsburgh 30, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

Canadian Distributor—Railway & Power Engineering Corp., Ltd.

For more data circle **219** on Reader Service Card

These will cut your Fixed Gaging Costs

1. Double-end plain cylindrical plug gage
2. Spline ring gage
3. Plain ring gage
4. Thread ring gage
5. Double-end thread plug gage
6. Reversible thread plug gage
7. Single-end plain cylindrical plug gage
8. Single-end thread plug gage

Taft-Peirce Gages have the Bargain *Built Right In!*

Here are two exclusive reasons why your best buy is always Taft-Peirce Fixed Gages: precision lapping and Electrolizing. Precision lapping eliminates "hills" and "valleys" which cause rapid wear — makes the gage accurate much longer. Electrolizing deposits an extremely hard, dense, non-magnetic alloy on all gaging surfaces, giving exceptional wear resistance, extremely low coefficient of friction, and high resistance to corrosion. Now you can get fixed gages with a much greater life span . . . and the slightly extra cost actually pays for itself! Ask for the Taft-Peirce Handbook showing the complete line of gages and tool-room specialties noted for that extra money-saving "Life-Value". Call your nearest T-P representative or write: The Taft-Peirce Manufacturing Co., Woonsocket, R. I.

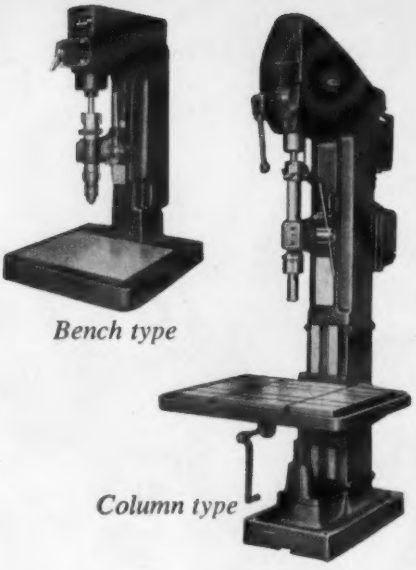
The Taft-Peirce Family — AIR GAGES • PRECISION GAGES
MAGNETIC CHUCKS • TOOL-ROOM SPECIALTIES
GRINDING MACHINES • LAPPING MACHINES

T-P

TAKE IT TO TAFT-PEIRCE

THE TAFT-PEIRCE MANUFACTURING CO.
WOONSOCKET, R. I.

T-P Means TOP Precision



Bench type

Column type

The many features of our standard drilling and tapping machines can be combined in more than 100,000 different ways—and one of those combinations exactly meets your requirements.

Capacities in cast iron from very small numbered drills to 2″; No. 32 Jacobs chuck to No. 4 Morse taper.

Six or 8 speeds up to 12,000 rpm; 4 feeds.

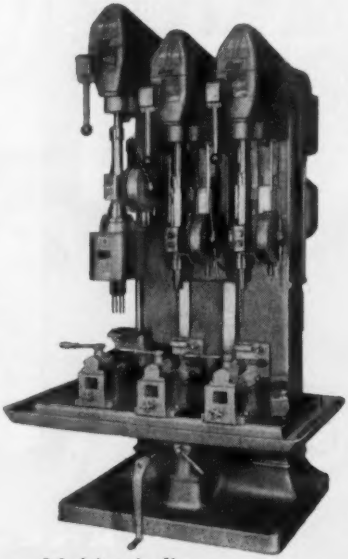
Avey has the right one

Column or bench type, with wide range of swing, 1 to 8 spindles.

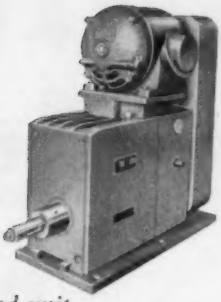
All of our standard drilling and tapping machines include such bonus features as micrometer stop collar, telescoping spindle guard, dynamically-balanced rotating parts, rack-and-pinion-operated motor plate, and our rugged, involute spindle construction.

Tool and die shops like the versatility, accuracy, and speed of our Tool Room machines. They're available with No. 2, 3, or 4 Morse taper. You select the table you need: large (34″ x 25″), round (18″ diameter), or compound (25″ x 12″).

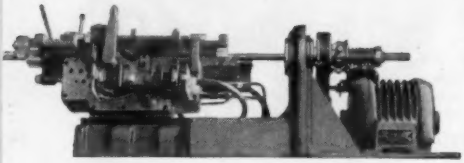
Ask for our literature; or, better yet, ask our representative to help you select the pay-off combination.



Multi-spindle



Cam feed unit



Avey-draulic

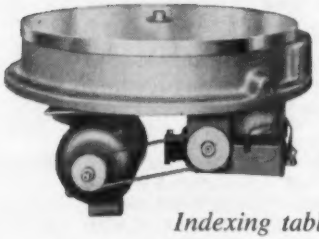
Avey

drilling, tapping, production machines

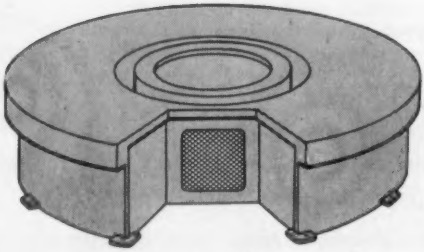
Sharp reductions in unit costs, floor space, machine-handling time, and operating time often make our high-production machines smart investments with fast pay-off periods. They have repeatedly proved this in some of the finest automatic lines in the country.

Our standard units can be combined for either rotary or linear operations. They can be economically re-engineered for successive jobs.

for Avey makes them all



Indexing table



Standard base

Automatic cam feed units, for drilling, tapping, reaming, hollow milling. Vee belt or gear drive. No. 1, 2, or 3 Morse taper. Mount at any angle. Fully or semi-automatic. Tamper-proof.

Avey-draulic feed unit. Automatic withdrawal for chip removal only when necessary during deep hole drilling. Rapid advance, feed, and rapid return. Standard strokes 12″ up to 30.″

Automatic index tables. Rapid, accurate indexing to .001″, 3 to 100 stations. Even or uneven index patterns. 16″ to 48″ diameter.

Steel bases. Stress relieved, sandblasted, machined, and painted to fit your application.

Send us a print of your part, and ask for a profit prediction.

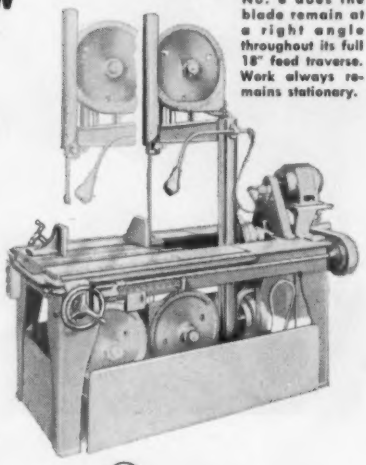
THE AVEY DRILLING MACHINE COMPANY
CINCINNATI 1, OHIO

For more data circle **222** on Reader Service Card

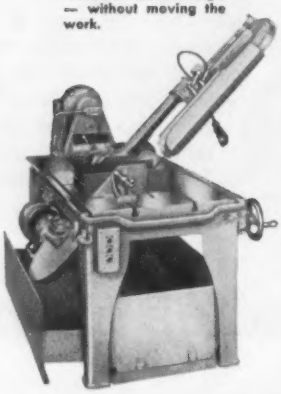
Never Confuse the No. 8 MARVEL with an ordinary Band Saw

...only the MARVEL is Universal

Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationery.



Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.



Only a No. 8 MARVEL can do all of these things: Snip-off a ½" rod or cut-off an 18" x 18" cross section.

Rough to Size and Shape

Miter

Index

cut off and shape Structural Beams

Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures; Etc.

"Rough Machine" to size and shape with minimun chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

MARVEL *Metal Cutting* SAWS

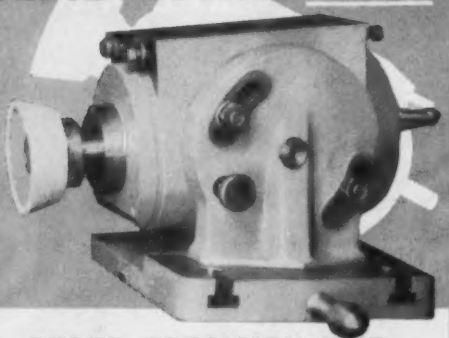
Better Machines-Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

For more data circle **223** on Reader Service Card

HERE'S A HEAD THAT TILTS

and Yours Will Nod, Too When You See What You Can Do With This One

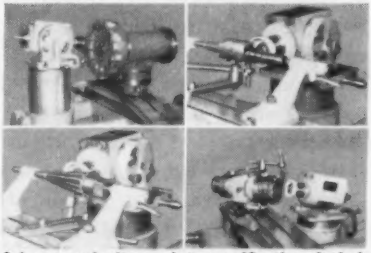


POPE SUPER PRECISION 1 HP, 3600 RPM MOTORIZED TOOL AND CUTTER GRINDER CLEARANCE ANGLE SWIVELLING HEAD

With Angular Adjustment In A Vertical Plane

Give this versatile head the nod and save time and money these seven ways:

1. You can use cup wheels for practically all clearance angles and thus produce a cutting edge on tools that lasts longer because it is stronger.
2. You can keep the tooth rest on the center line of the cutter for practically all grinding on centers or in the work head.
3. You can grind most cutters and reamers all over *with a single set-up* using the swivelling table and Pope tilting head.
4. You can read all clearance angles directly in degrees from the scale provided on the head. No more mistakes.
5. You can get the right clearance angle on such tough grinding jobs as slab mills, taper reamers, angular cutters and form tools.
6. You have one safe speed — 3600 RPM — for all wheels generally used on cutter grinders. Heat checking of cutters is virtually eliminated.
7. You have a head that's so easy to adjust and use it saves you time and money every time you grind a tool.



Ask us to submit complete specifications including price and delivery.

No. 101

Specify **POPE** PRECISION SPINDLES

POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET · HAVERHILL, MASSACHUSETTS

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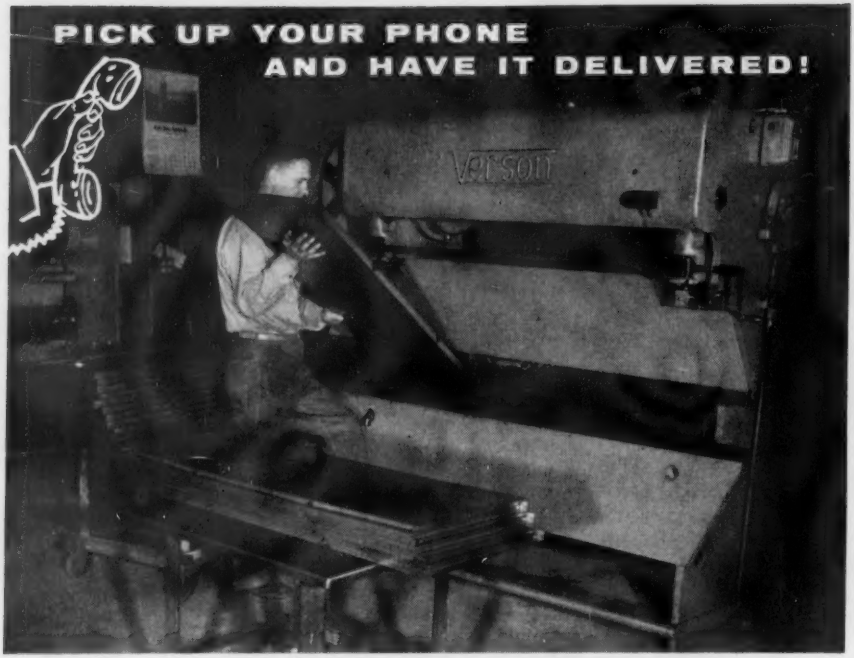

Verson Model 1062 Press Brake, $2,630.00*, *available from stock*

● It doesn't take weeks and months to have this press brake delivered. Standard Verson Model 1062 Press Brakes are in stock. You can get them right off the shelf! Just pick up your phone and order.

Famous Verson quality and design are built into this press brake and its smaller companion, the 16-48. Big brake standards of construction provide an economical answer to a wide variety of jobs in both large and small shops.

Verson Model 1062, 16 ga. by 78″ capacity, is priced at $2,630.00*; Model 16-48, 16 ga. by 48″ capacity, is $1,600.00*. Order yours today. *Both are available from stock!*

*Prices, F.O.B. Chicago, less dies; subject to change without notice.

Verson

ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

VERSON ALLSTEEL PRESS CO.

9310 S. Kenwood Avenue, Chicago 19, Illinois
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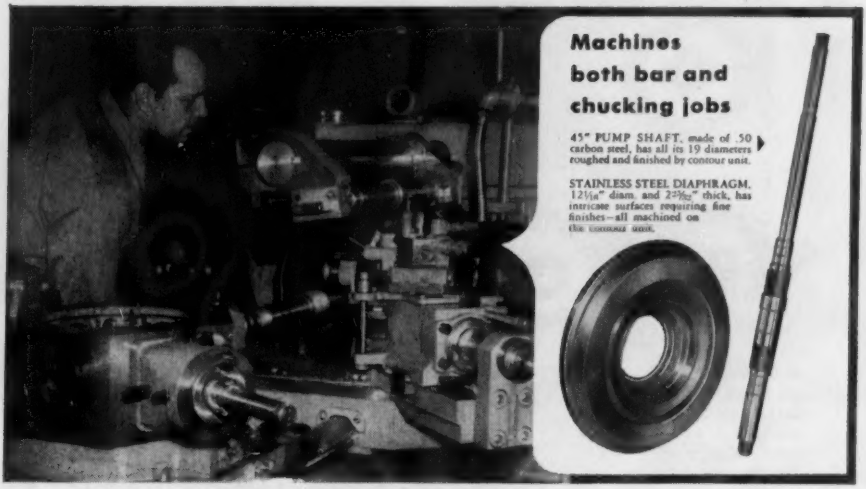
MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES
TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES

For more data circle 225 on Reader Service Card

WARNER & SWASEY WITH NEW CONTOUR UNIT

DOES FULL DAY'S WORK IN 66 MINUTES!


Machines both bar and chucking jobs
45" PUMP SHAFT, made of .50 carbon steel, has all its 19 diameters roughed and finished by contour unit.
STAINLESS STEEL DIAPHRAGM, 12 1/16" diam. and 2 23/32" thick, has intricate surfaces requiring fine finishes—all machined on the contour unit.

J. S. COFFIN, JR. COMPANY, Englewood, N. J. accomplished this startling time reduction on the 45" pump shaft, shown above. They transferred it from a fairly new standard turret lathe to a 2-A Extra Heavy Duty Turret Lathe equipped with Warner & Swasey's new Contour Unit.

This shaft, for their boiler feed pumps, has 19 different diameters, with as little as .010" difference between some adjacent diameters. It also has a taper and 4 Class 3 threads. Previously, it required 7 hours of machining on a standard turret lathe, using accepted turret lathe practice—indicating the money-saving advantages of this new Warner & Swasey Contour Unit.

Now the shaft is quickly cut down from 3¼" bar stock to finished diameters ranging between 1⅜" to 2⅞" using the separate rough and finish cutters in the hydraulically-operated unit's turret. It is roughed out with two and three cuts using the same cutter by simply flipping the tracer unit's leaf stops. A finish cut is then taken over the entire length of the shaft. From start to finish—only 66 minutes, including many other conventional cuts!

This unique contour unit also machines the intricate stainless steel diaphragm shown, providing Coffin similar time savings.

Operators like the unit's fast setup, and the over-all ease of machine handling that results from the 2-A's automatic head shifting. After pre-selecting his speeds, and pushing the master lever, an operator can position tools for the next cut while the head automatically shifts.

This story shows the time and money-saving possibilities this new, versatile combination of turret lathe and contour unit opens for you. For the complete facts on how it can cut costs for you, call in your Warner & Swasey Field Representative.

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY

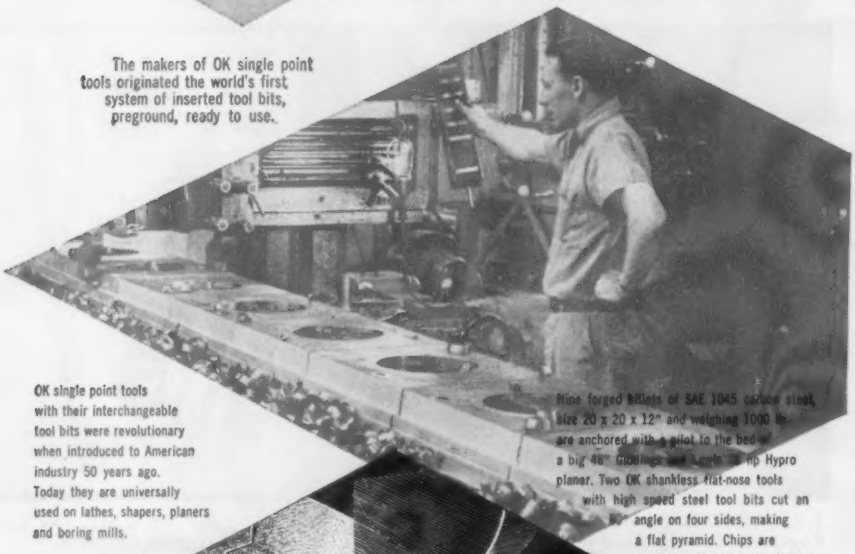
For more data circle **226** on Reader Service Card

How Bullard with two

Man-au-trol turret heads are gang-planed

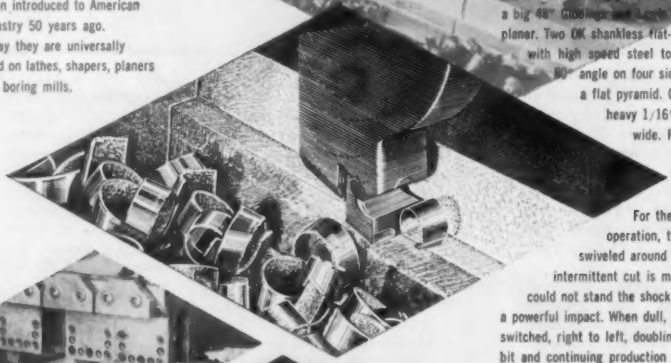
OK single point tools

The makers of OK single point tools originated the world's first system of inserted tool bits, preground, ready to use.



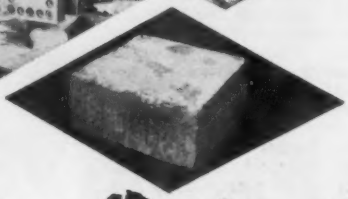
Nine forged billets of SAE 1045 carbon steel, size 20 x 20 x 12" and weighing 1000 lb. are anchored with a pilot to the bed of a big 48" Cincinnati-Bickford 15 hp Hypro planer. Two OK shankless flat-nose tools with high speed steel tool bits cut an 80° angle on four sides, making a flat pyramid. Chips are heavy 1/16" depth, 3/4" wide. Feed, 40 ft/m.

OK single point tools with their interchangeable tool bits were revolutionary when introduced to American industry 50 years ago. Today they are universally used on lathes, shapers, planers and boring mills.



For the second operation, the blocks are swiveled around and a rugged intermittent cut is made. Carbide could not stand the shock of such a powerful impact. When dull, tool bits are switched, right to left, doubling to life of the bit and continuing production with the minimum of downtime.

OK tools are built for heavy machining. Holders are tough forgings. For tool bits, you have a choice of high speed steel, cobalt, Vasco Supreme and carbide.



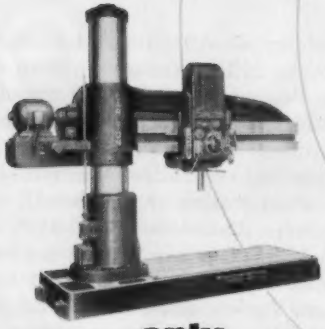
Write for OK Tool Catalogs

TWO COMPONENTS— BODY AND BLADES

modern milling cutters for modern milling machines

THE OK TOOL CO., INC., Milford, New Hampshire

For more data circle **227** on Reader Service Card



only

Carlton

radial drills

give you a choice of 3 *speed-feed controls...*

Programming for pre-selecting speeds and feeds for an entire drilling program including as many as 20 or 30 operations. *Pre-selector* for setting speed and feed for the next operation while machine is still under cut. *Manual* to take advantage of Carlton's centralized push button control. For further information, send today for free descriptive bulletin. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

For more data circle **228** on Reader Service Card

when dollars count, specify Gilbert

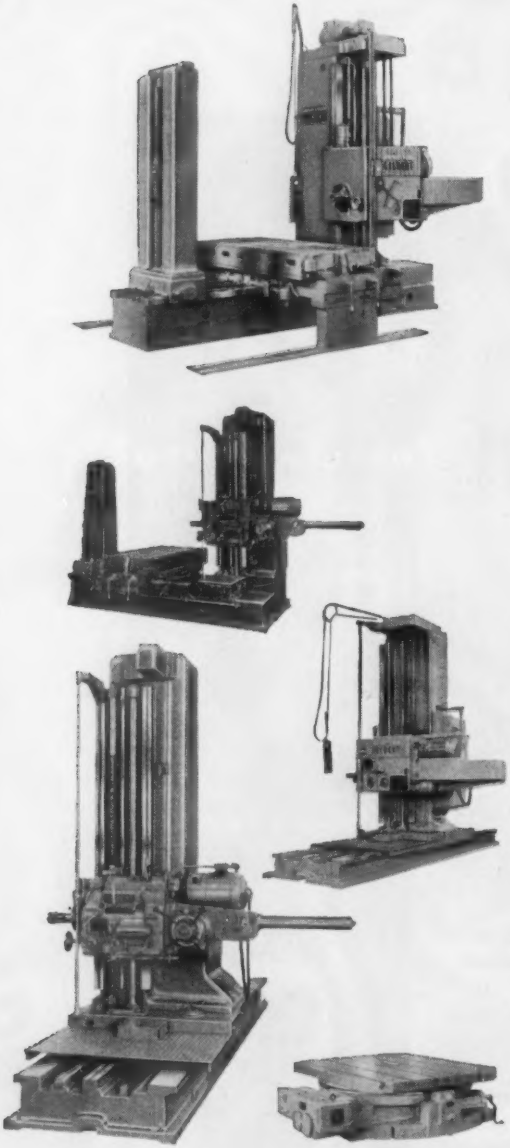


table type—All Gilbert table type boring mills feature built-in reversible motor, hardened spindle, anti-friction bearings throughout, hardened ways on bed, pressure lubrication, centralized controls (on pendant station or unit head). Spindle diameters: 3½″, 3¾″, 4″, 5″. Morse taper or milling machine taper. Spindle speeds up to 1500 rpm. Variety of table sizes, column heights. Automatic positioning available with saddle supports.

floor type—Many types of base plates, bases, or tables can be combined with a Gilbert floor type boring mill to make it one of the most productive tools in your plant. With a revolving column, this machine can do certain types of profiling and duplicating at a fraction of the cost of other machine tools used for this type of work.

Choice of runway sizes and column heights, plus workholding units, give you a great range of work capacity. Can be adapted to existing runways.

rotary tables—Hand revolving, power rotary, and power-feed rotary tables are available in these sizes: 36″, 50″, 60″, 72″ square and round. Special tables can be built.

accessories—Milling attachments, facing heads, boring bars, end measuring instruments, etc., are available at competitive prices.

These machines may be purchased under our new low-cost financing plan: 6% simple interest (3% add on), up to 5 years to pay.

those who buy Gilbert buy **GILBERT** *again*

The Cincinnati Gilbert Machine Tool Co.
3366 Beekman St., Cincinnati 23, Ohio

For more data circle **229** on Reader Service Card

when performance counts, specify Gilbert

features—The first radials to offer flame-hardened 9″ and 11″ columns. Centralized controls, quick response, maximum work visibility cut machine-handling time. Alloy steel spindle quill has a long bearing in the head. Spindle is mounted on 5 precision ball bearings. Hardened tang slot, safety elevating nut and screw. A wide variety of bases can be furnished, or the Gilbert can be mounted on runways or rails.

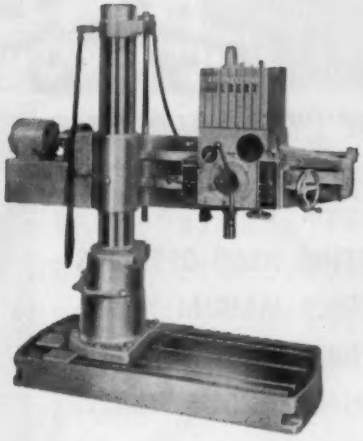
new 3 hp radial
Automatic spindle reverse, adjustable spring counterbalance.
Arm length: 3′ or 4′.
Column diameter: 9″.
Spindle radius from column center, max.: 42¾″, 54¾″.
Spindle traverse in head: 10″.
Morse taper in spindle: #4.
12 spindle speeds to 3200 rpm.

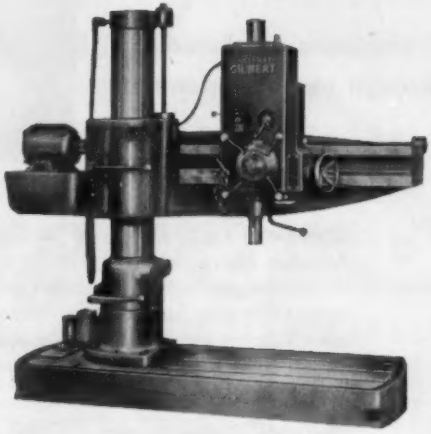
5-7½ hp radial
Arm length: 3′, 4′, or 5′.
Column diameter: 9″ or 11″.
Spindle traverse in head: 12″
Morse taper in spindle: #4 or #5.
12 spindle speeds to 1800 rpm.
Spindle radius from column center, max.: 44½″, 56½″, 68½″.

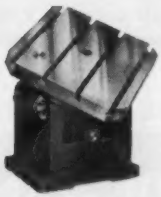
universal table—For use with either radial drills or horizontal boring mills, Gilbert universal tables permit machining 5 sides of a cube at one setting of the work piece. Sizes: 22″x22″ and 27″x27″ tops.

These machines may be purchased under our new low-cost financing plan: 6% simple interest (3% add on), up to 5 years to pay.

write for new literature







those who buy Gilbert buy **GILBERT** *again*

The Cincinnati Gilbert Machine Tool Co.
3348 Beekman St., Cincinnati 23, Ohio

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RADIAC®

TYPE "JH" ABRASIVE CUT-OFF MACHINE

FOR WET CUTTING ONLY

CUTTING HEAD OPERATES EITHER MANUALLY OR HYDRAULICALLY - - WITH VARIABLE FEEDS & STROKES

•

Increases production through ease of operation

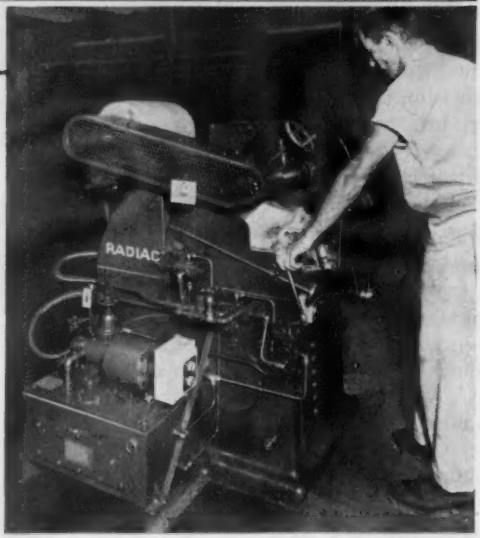

Photo through courtesy of Standard Pressed Steel Co., Jenkintown, Pa.

Operated by a 10 H.P. Motor and using an 18" Rubber Bonded RADIAC Abrasive Blade, this de Sanno Type "JH" Abrasive Cut-off Machine introduces new production economies and operating efficiency. Its hydraulically operated cutting head reduces operator fatigue. It features a foot treadle for operating the work vise, and an emergency reversing rod with mushroom button. Specially designed for production cutting of steel bars up to 2⅝" D., and tubing up to 4" O.D.

There are 10 other types of RADIAC Cut-off Machines—and a complete line of Abrasive Cut-off Blades—to meet your specific requirements. Write for illustrated Bulletin today. Exclusive dealers located throughout the United States.

Use **RADIAC** *Blades with* **RADIAC** *Machines*

A. P. DE SANNO & SON INCORPORATED

PHOENIXVILLE PENNA., U.S.A.

Manufacturers of Abrasive Cut-off Machines • Abrasive Cut-off Blades • Grinding Wheels

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modern machine shop
431 Main Street
Cincinnati 2, Ohio

Circle KEY numbers (NOT PAGE NUMBERS) for more information on items described or advertised in this issue.

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25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650	675	700

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machine shop

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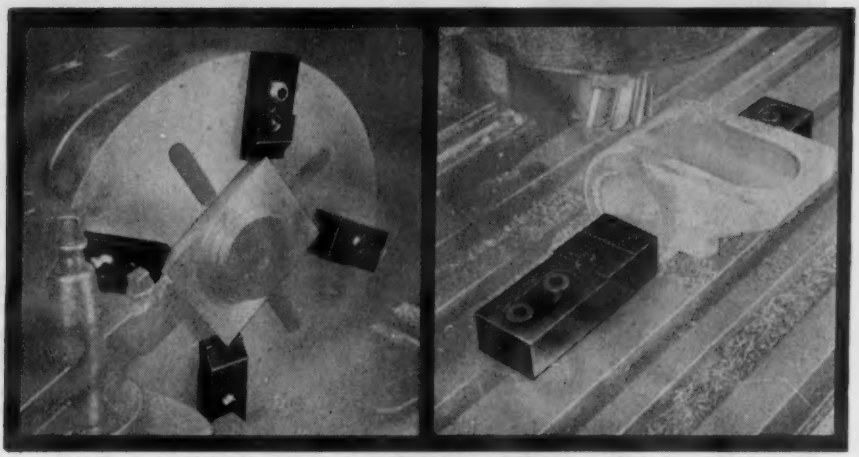


J & S "ALL-PURPOSE" JAW CLAMPS CAN BE USED ON ALL STANDARD TYPES OF MILLING MACHINES, LATHES, PLANERS, BORING MILLERS, DRILL PRESSES, AND OTHER MACHINE TOOLS

Eliminate "U" Clamps, Straps and Fingers, cut handling time 75%

J & S "All-Purpose" Jaw Clamps give you many unusual advantages in securing workpieces to machine tools—save as much as 75% of the time required with outdated methods.

Downholding Principle

J & S' *downholding* principle makes this possible. Here's how it works: When you turn the adjusting screw of the clamp, the jaw travels straight *in* and *down*. This forces the workpiece horizontally against the opposite clamp and downward against the face plate or table. In this way, centering is quick, simple. The tapered slot prevents the clamp from slipping regardless of the load.

Need no U-clamps or straps

With J & S "All-Purpose" Jaw Clamps, you can avoid the use of U-clamps and straps, disregard different length studs and blocking. You can also minimize obstructions in set-ups, reduce cut-off waste. You can pass over J & S Jaw Clamps 1" from the working surface of the machine face. The whole surface of the workpiece can be machined to within ⅛" of the face plate or table.

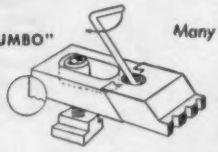
You can get J & S "All-Purpose" Jaw Clamps in a variety of sizes Write for complete information today

J & S "JUMBO" and "LI'L GIANT" JAW CLAMPS

For large planers

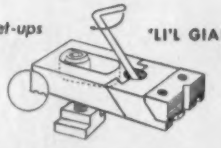
Many times more powerful than finger set-ups

"JUMBO"



COMPLETELY HARDENED

"LI'L GIANT"



Both clamps have T-nuts which fit all large standard planers. 45° oblique travel of jaw secures workpiece against table and against counterthrust of opposite clamp. ⅛" back taper (dotted line) and relieved ground surface (magnified detail) prevent slippage

J&S TOOL CO., INC.

WHEEL DRESSERS • JAW CLAMPS • PRECISION VISES • SINE BARS • DOWN-HOLDING DEVICES

871 DORSA AVENUE, LIVINGSTON, NEW JERSEY

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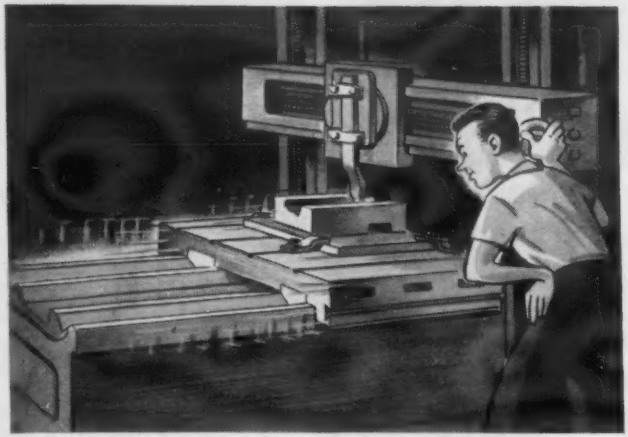
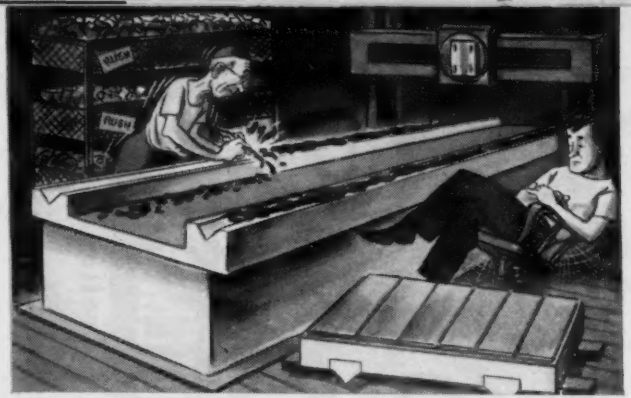


1. Cures "stick-slip" or "jumpy table". When a table gets the "shakes", especially after it has just reversed or when the load is heavy and the speed slow, it's probably suffering from "stick-slip". Remedy—Sunoco Way Lubricant®. Special polar compounds in Sunoco Way Lubricant form a friction-reducing film that keeps a table sliding smoothly under all operating conditions.

2. Doesn't squeeze out. When you use a heavy oil as a way lubricant, you must use a lot of oil to maintain a thick enough film. But, heavy oil squeezes out if the table sits in one position very long. You have a tough time getting the table moving again. Protected by the tenacious thin film formed by Sunoco Way Lubricant, the machine can be idle for a week and it will start easily.

WHY SUNOCO WAY LUBRICANT CAN HELP CURE YOUR MACHINING PROBLEMS



3. Protects expensive ways. Badly scored or pitted ways, caused by inadequate way lubrication, result in lost production and expensive repairs. The high film strength of Sunoco Way Lubricant eliminates the danger of metal-to-metal contact, the chief cause of scoring and way wear. Excellent metal-wetting and non-corrosive properties eliminate rusting and pitting.

For the lubrication of slides
and ways on this machine,
we recommend the use of
SUNOCO WAY LUBRICANT
a product of
SUN OIL COMPANY

4. Approved by more than 55 machine-tool builders. Every major machine-tool builder has tested Sunoco Way Lubricant. It is always approved. In fact, to assure maximum efficiency of their product, many manufacturers ship a supply of Sunoco Way Lubricant with each machine. We'll be glad to send you the list of manufacturers who have approved Sunoco Way Lubricant.

For more information, see your Sun Representative, or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. MM-11.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

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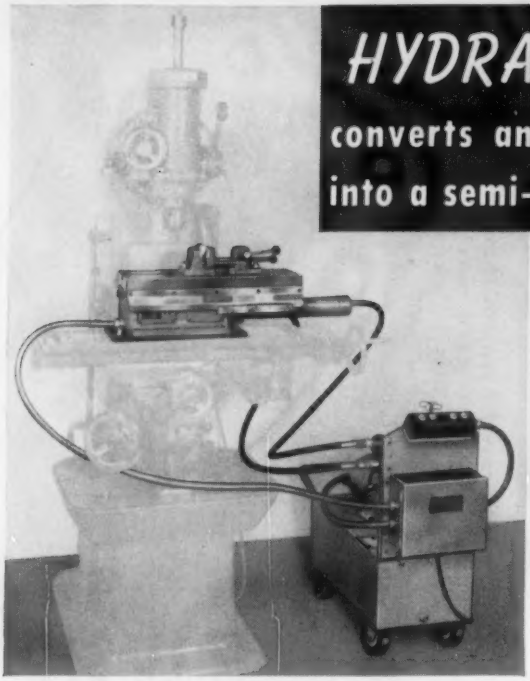


HYDRAULIC SLIDE

converts any toolroom miller into a semi-automatic machine

ATTACHMENT CAN BE SET UP IN 5 MIN. WITH PORTABLE POWER PACK

MANY PROFITABLE *mass production* operations can be handled on your standard toolroom milling machine with this precision slide attachment! Started by push-button, it cycles automatically through rapid approach, feed, dwell and rapid return.

Only 5 min. are required to mount the slide assembly on the machine table and connect hydraulic hoses and an electric cable to the self-contained Power Pack. The Power Pack plugs into any 110-volt a-c outlet.

Find new uses for your toolroom miller! Keep it busy full-time on profitable work! Learn how the Gilman Hydraulic Slide Attachment can help you . . .

OPERATING DETAILS

- **TRAVEL LENGTHS** (rapid approach and feed) regulated by adjustable bar cams which actuate built-in limit switches. Overall stroke 8 in.
- **SPEED RATES** (rapid traverse and feed) infinitely adjustable to 160 in. per min. max.
- **SLIDE TABLE** has combination keyway and T-slot to receive ½-in. key or ⅜-in. T-bolts or T-nuts.
- **LIMIT SWITCHES** can be added to tie in slide movements with automatic work clamping and spindle feed control.
- **POWER PACK** has ½-hp., 2½-g.p.m. hydraulic pump and 10-gal. fluid reservoir. Moves easily on rubber wheels.

Write now for FREE bulletin

RUSSELL T. GILMAN, Inc.

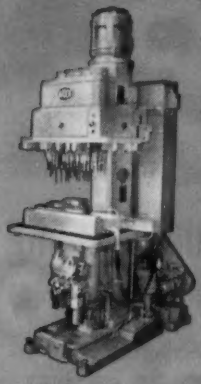
621 Beech St. • Grafton, Wis.

For more data circle 235 on Reader Service Card

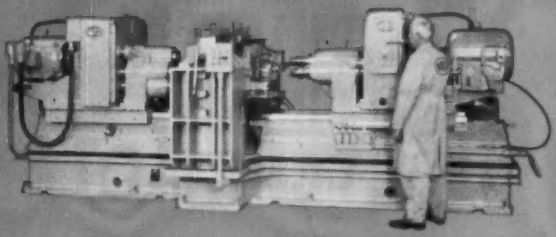
Drill ■ Bore ■ Face ■ Tap

ON A MULTI-SPINDLE NATCO®

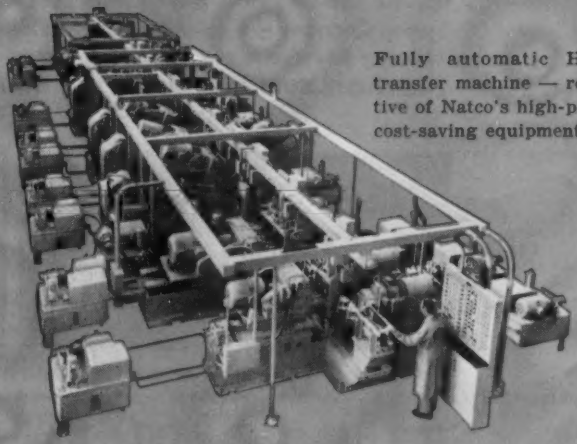
High production or job lot flexibility... Natcos range from small, light sensitive drilling and tapping machines to fully automatic, high-production transfer machines. Special machines designed and fixtured to solve specific production needs.



High-speed, light sensitive, multi-spindle drillers and tappers. Available with adjustable heads, hand and foot feed or hydraulic feed tables. 3-position automatic fixture slides and rotating tables for fixtures.



Way-type horizontal machines for drilling, boring, facing and tapping. Hydraulic feed, automatic lubrication to heads, individual lead screws for tapping, coolant systems with magnetic chip separators.



Fully automatic Holeway® transfer machine — representative of Natco's high-production, cost-saving equipment.

Call Natco offices in Chicago, Detroit, Buffalo, New York, Boston, Philadelphia, Cleveland and Los Angeles. Distributors in other cities.

NATIONAL AUTOMATIC TOOL COMPANY, INC.
Richmond, Indiana

NATCO

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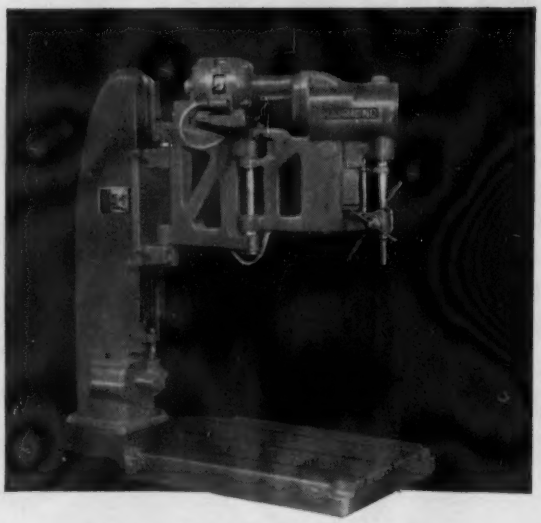
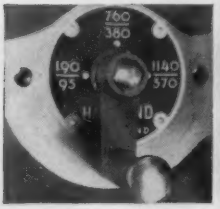


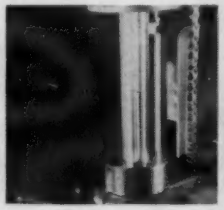
for *faster* radial drilling and tapping

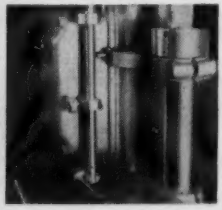
■ Hammond Radial Drilling and Tapping Machines may be spotted in the production line for drilling, tapping or reaming. With its unique Bracket Type construction the spindle can be swung quickly from hole to hole. Six Quick Speed Changes are instantly available and the Hammond Tapping Reverse is very fast and convenient to operate.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building







Engineered for production

FOOTBURT

MACHINE TOOLS

For more data circle **237** on Reader Service Card

"More than TWENTY MILLION HITS since we changed to Lamina Guide Pins and Bushings!"

"Since changing to Lamina Guide Pins and Bronze-plated Bushings on our dies, they have run more than 20,000,000 hits . . . and they're still going! Formerly, the best we could get was 4,000,000 to 5,000,000 hits on any make." *This is a typical quotation from an actual user letter.*

Lamina bronze-plated wring-fit bushings are pre-finished on the I.D. Seated on a shoulder square with the die shoe surface and secured by special retainers, they assure distortion-free, full bearing surface that results in better die alignment, less maintenance and longer die life.

Lamina Guide Pins are special tool steel, heat treated, spray quenched, hardened, ground and burnished. The uniform, hard surface resists wear, while the tough core won't bend in installation or use. These dimensionally accurate pins do not "mushroom" or get out of round, and require no "running in."

There is a size and type Lamina Guide Pin and Bushing for every need. Our new catalog shows illustrations, applications, dimensions and prices of more than 800 items. Ask your die set supplier, or write us for your free copy now.

SHOULDER TYPE PIN. 1" to 4½" diameter. Straight and Removable types also available.

LONG SHOULDER Bronze Plated Bushing contains pin during entire stroke. ¾" to 3" I.D.

NUT TYPE Bronze Plated Bushing for wide range of requirements. 1" to 2" I.D.

***SPECIAL PINS AND BRONZE-PLATED BUSHINGS** for any application . . . tailored to your requirements. Send prints for prompt quotation.*

Lamina
DIES AND TOOLS, INC.
P.O. BOX 31, ROYAL OAK, MICHIGAN

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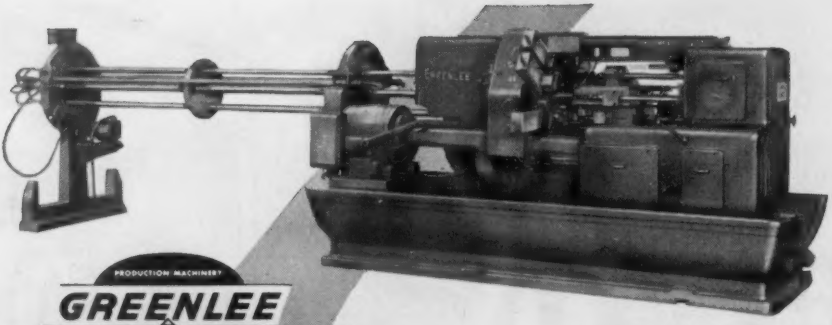

PRODUCTION MACHINERY

GREENLEE

AIR-FEED AUTOMATIC

1. **Permits Greater Job Versatility**
2. **Easily Adapted To Multiple Feedouts**
3. **Provides Longer Stock Feedout**
4. **Eliminates Stock Scoring**
5. **Reduces Stock Reel Noise**
6. **Eliminates Stock Pushers**
7. **Eliminates Feedout Cams**

Write today for Catalog A-405, or better still, have the Greenlee man call and show you the way to more profitable production with this machine.

PRODUCTION MACHINERY

GREENLEE

GREENLEE BROS. & CO.
1891 MASON AVE.
Rockford, Illinois

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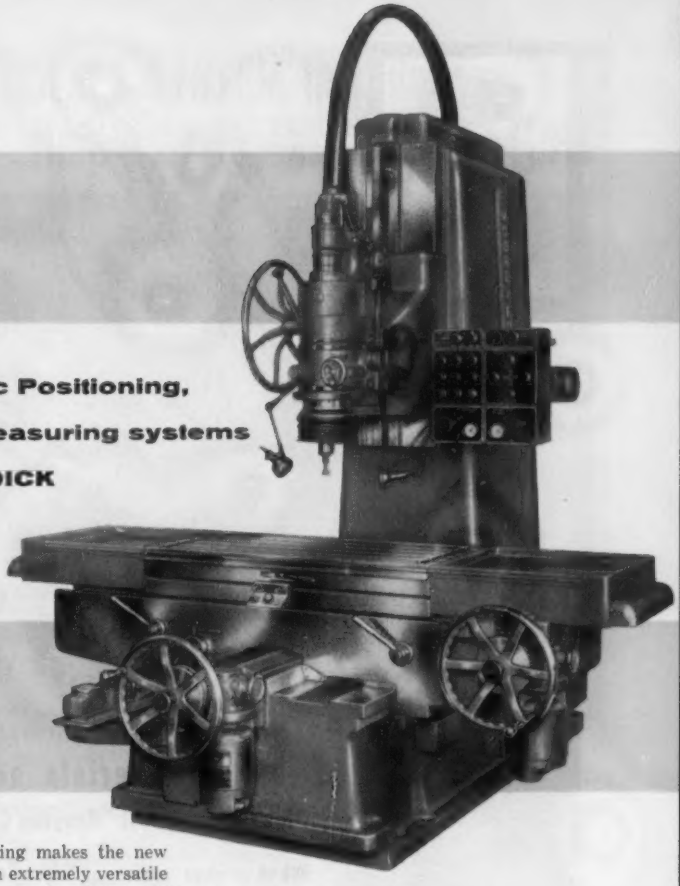
NOW...Automatic Positioning,

choice of two measuring systems

on MOORE-FOSDICK

Jig Grinder!



Exclusive automatic positioning makes the new Moore-Fosdick Jig Grinder an extremely versatile machine! Besides large work capacity (22" x 44" or 18" x 36" x 27" height) you get increased speed and precision. At the touch of a button, table and saddle position automatically to ± .0001"!

A choice of two precision measuring systems is available. With the new and exclusive Direct Dimension Measuring, dimensions from blueprint are simply set on direct-reading drum dials. The other system, Rod and Bar Measuring, employs measuring rods, micrometers, and for high production work, duplicating bars. Either measuring system may be installed with or without automatic positioning, but both systems cannot be installed on the same machine.

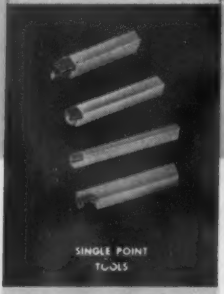
On the Moore-Fosdick Jig Grinder you can grind conical holes with taper in either direction, as well as cylindrical holes. An angular and indexing device built into the main spindle, and the recently developed slot grinding attachment, give quick, accurate grinding of any contour — *regular or irregular*. Write for price and delivery information.

Other outstanding features include: infinite range of grinding speeds—12,000 to 60,000 rpm, contour and chop grinding, spindle-housing heat control.

NEED JIG GRINDING EQUIPMENT? GET A PROPOSAL FROM FOSDICK!

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

FOSDICK



Newest Materials and Methods—

Plus the Toughest "Proving Ground" in Industry

What makes one tool better than another? Engineers boil it down to three factors: (1) careful selection of the newest tool materials, (2) proper tool design, (3) accurately controlled heat treatment.

Continental is constantly testing these three factors in actual production in Ex-Cell-O plants.

Call your Ex-Cell-O representative or contact Continental direct.

CTW

56-62

Continental TOOL WORKS

Division of Ex-Cell-O Corporation, Detroit 32, Mich.

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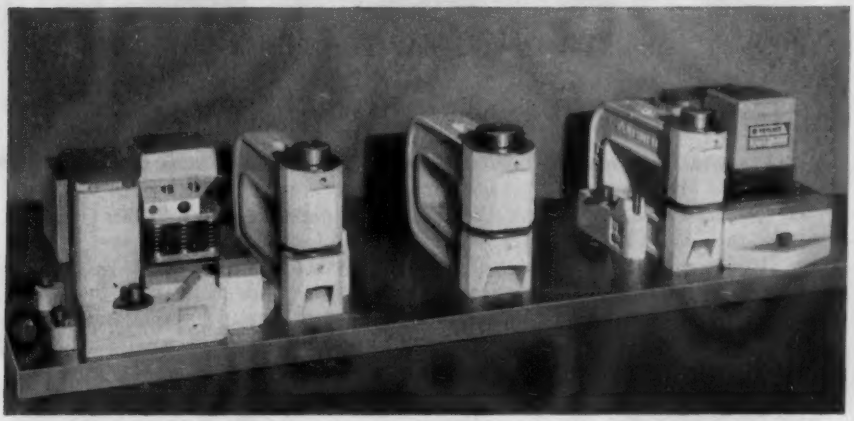
Latest TOOLSET SYSTEM introduces "PEG BOARD" simplicity to PUNCHING & NOTCHING SETUPS



CLEARS TRACK for REVOLUTIONARY TOOLING, PRODUCTION and INVENTORY SAVINGS on LONG and SHORT RUNS

In addition to being self-contained, self-aligning and self-stripping, TOOLSET Punching and Notching Units are self-locating when used and re-used with TOOLSET punch pattern plates,—quick as a "Peg Board".

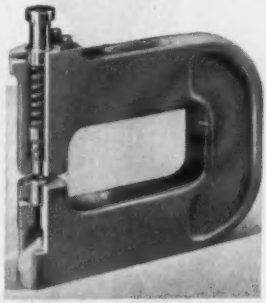
Men who work with ferrous, non-ferrous and non-metallic sheet materials are discovering new ways to save on tooling, setup, production and inventory costs, thanks to THE TOOLSET SYSTEM.

In addition to production run economies, —short, repeat and custom runs can be set up with "Peg Board" speed.

Your local TOOLSET representative is factory trained and qualified to help you work out the most economical setup.

Another TOOLSET EXCLUSIVE!
3 POINT PUNCH GUIDING

TOOLSET Piercing Units offer latest design improvements including 3 Point Guiding for accurate punching, burr-free holes, longer punch and die life, and many other advantages worth knowing about.



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ESSENTIAL for SUPER ALLOYS

TOOLSET, Inc.

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TOOLSET Representatives as Near as Your Telephone

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NEW—from

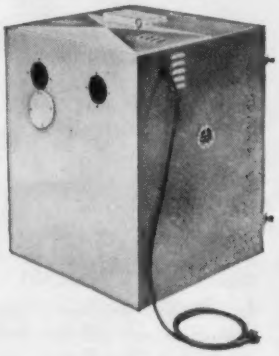
WALKER-TURNER

The finest precision grinders ever built —the new Walker-Turner "Light-Heavyweights". Designed to do the most exacting grinding operations *quickly* and *economically*, and save you time and money. Low initial cost, positive accuracy, and advanced safety features make Walker-Turner Grinders ideal for your plant.

Ask your Walker-Turner distributor to demonstrate the superior advantages of these versatile grinders and other famous Walker-Turner tools. Mail the coupon below for complete information.

NEW WALKER-TURNER
6" CARBIDE TOOL GRINDER

. . . keeps your carbide-tipped cutting tools at peak efficiency. Vibration-free operation assures true grinding. Tables tilt to permit wet or dry grinding at any angle.



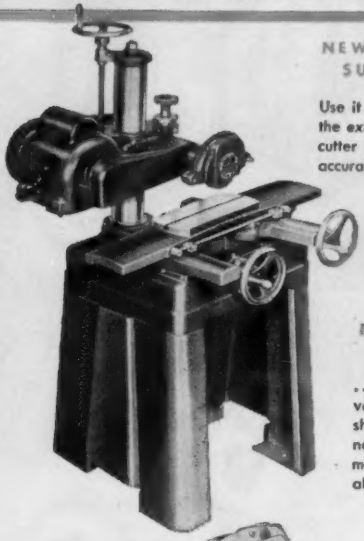
NEW WALKER-TURNER
DUST COLLECTOR

. . . has strong, pressed steel cabinet, removable filter, enclosed ½ H.P. motor and fan that moves 350 cubic feet of air per minute. Unit is compact and portable.

A complete line of "Light-Heavyweight"

GRINDERS

to bring you New production economies

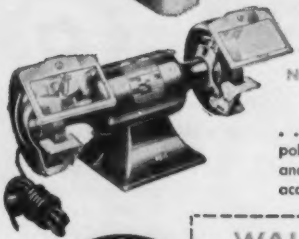


NEW WALKER-TURNER
SURFACE GRINDER

Use it as a big capacity grinder that offers you the *extra* ability to do chip-breaker and tool and cutter grinding. You get simple set-up, precision accuracy, *AND* surprisingly low cost.

NEW WALKER-TURNER
7" TOOL GRINDER

. . . combines positive accuracy with advanced safety features. You get dual shatterproof-glass eye shields, engineered wheel guards, dust chutes, removable steel side plates, and adjustable spark deflectors.



NEW WALKER-TURNER
6" BENCH GRINDER

. . . takes up minimum space for grinding, polishing and buffing. Balanced grinding wheels and precision ground shaft provide smooth, accurate performance.

walker-turner

WALKER-TURNER
Division of Rockwell Manufacturing Co.,
Dept. WL-22, 400 North Lexington Ave., Pittsburgh 8, Pa.

( ) Please send name of my Walker-Turner distributor.
( ) Please send literature on Walker-Turner Grinders.

Name_____

Address_____

City_____ Zone____ State_____

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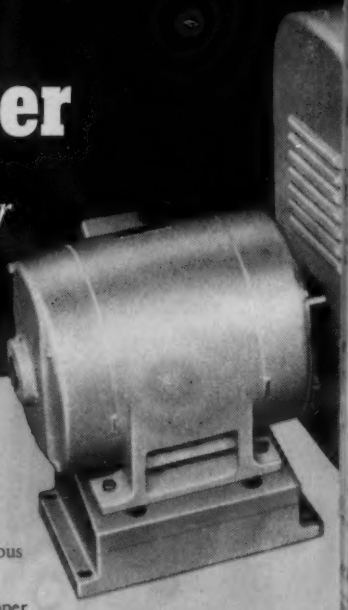
Now Available from Le Blond...

No. 30 Rapid Borer

to Bore Holes Faster than Ever Before



With the new LeBlond-Carlstedt Rapid Borer, you can bore, trepan or counterbore holes *3 to 8 times faster than by the conventional D-bit method!*

The Rapid Borer was developed expressly to accommodate revolutionary new tooling which cuts at very high speed with good accuracy and finish. Cutting oil is forced between the boring bar and hole wall forming a continuous bearing. It flushes back through a hole in the boring head and bar, carrying away the chips as it goes. Chip form is controlled both by tool angles and proper feed and speed combinations; thus tool faces are kept clean and chip passage clear. Cutter design produces balanced cutting pressures thereby controlling concentricity.

This new tooling requires a machine with the following characteristics, all of which are incorporated in the LeBlond Rapid Borer design:

High spindle horsepower
Ample rigidity throughout
Complete absence of vibration at all speeds
Infinitely-variable feeds (up to 38" per minute), independent of speeds, while running under load
Final drive to spindle through belts
Large volume of cutting oil

Basically, the Rapid Borer is suited to work that is symmetrical for balance in rotation—round, square, octagonal, tapered or stepped. A wide variety of hole diameters and depths as well as work sizes can be accommodated.

Tell us about the holes you'd like to produce faster. Large holes or small. If the Rapid Borer can handle the job, we'll show you how to produce them faster than ever before.

BRIEF SPECIFICATIONS, No. 30 RAPID BORER

Workpiece diameter	¾" to 6 1/16"
Boring and workpiece lengths (max.)	18", 42" or 66"
Solid boring	½" to 1¼"
Trepanning or counterboring	2⅜" max.
Spindle speeds	Single speed or variable to 2500 rpm
Main drive motor	30 hp

EXAMPLES OF WORK BORED IN OUR SHOP

1. Drive Shaft, 29½" x 2⅜"
Blind hole, 25" deep, .887" dia.
Material, 4140
Penetration rate, 6¼"/min.
Floor-to-floor, 5.5 minutes
Old method* floor-to-floor, 29.2 min.

2. Barstock, 13⅛" x 2⅛"
Through hole, 1,062" dia.
Material, C1141
Penetration rate, 7¼"/min.
Floor-to-floor, 3.2 min.
Old method* floor-to-floor, 19.4 min.

3. Barstock, 10 13/16" x 2⅛"
Through hole, 775" dia.
Material, C1141
Penetration rate, 7"/min.
Floor-to-floor, 3.03 min.
Old method* floor-to-floor, 14 min.

** Old method—conventional D-bit*

...cut with confidence

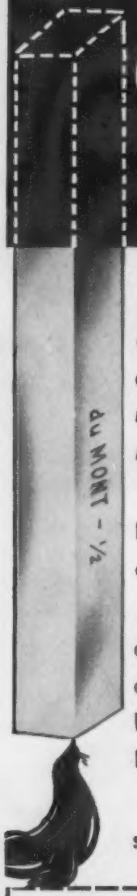
The R. K. LeBlond Machine Tool Company

Cincinnati 8, Ohio

World's Largest Builder of a Complete Line of Lathes for more than 69 Years

LeBLOND of Cincinnati

PRECISE BALANCE EXTENDS THE CUTTING LIFE of du MONT TOOL BITS



The special steel used in du Mont Tool Bits is precisely balanced in *toughness, red hardness* and *wear resistance.*

Result: du Mont Tool Bits keep a keener cutting edge considerably longer.

Compare performance, compare cost and you'll be convinced that du Mont Tool Bits give you more cuts per bit, more cuts per dollar.

High speed, ground square and rectangular.

The du MONT CORPORATION,
Greenfield, Mass.

MAIL FREE Tool Bit COMPARISON CHART, CATALOG and PRICE LIST S to

Name.....

Company.....

Address.....

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Meetings

Important Meeting Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

November 7-9 • Steel Founders' Society of America, Technical and Operating Conference, Carter Hotel, Cleveland. Society headquarters: 606 Terminal Tower, Cleveland 12, Ohio.

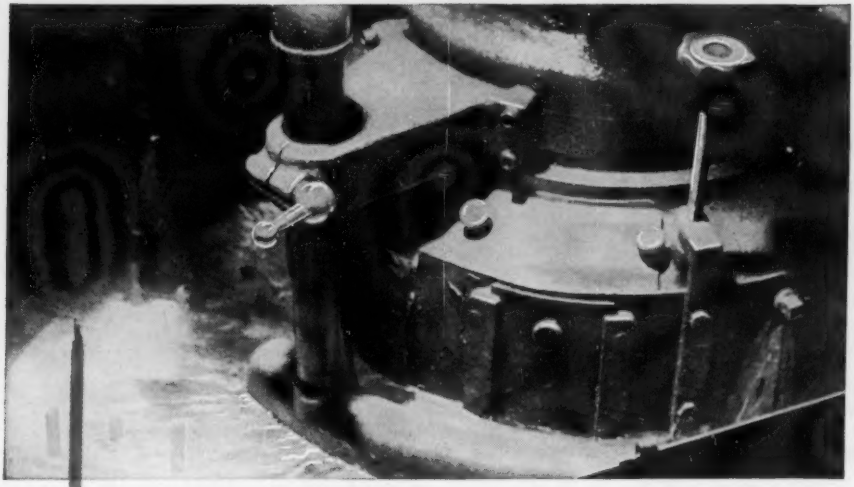
November 12-16 • National Electrical Manufacturers Association, Annual Meeting, Traymore Hotel, Atlantic City, N. J. Association headquarters: 155 E. 44th St., New York 17, New York.

November 25-30 • American Society of Mechanical Engineers, Annual Meeting, Hotel Statler, New York. Society headquarters: 29 W. 39th St., New York 18, New York.

November 26-30 • National Exposition of Power and Mechanical Engineering, Coliseum, New York. Information: International Exposition Co., 480 Lexington Ave., New York 17, New York.

November 26-30 • International Automation Exposition, Trade Show Building, New York. Information: Richard Rimbach Associates, 845 Ridge Ave., Pittsburgh 12, Pa.

November 27-30 • National Chemical Exposition, Public Auditorium, Cleveland. Information: American Chemical Society, Chicago Section, 86 E. Randolph St., Chicago 1, Illinois.



for better grinding... K-7

K-7 gives superior results in grinding all steels, cast and malleable irons, titanium, carbon, rubber, ceramics and plastics (not recommended for non-ferrous metals). This all-chemical water soluble liquid concentrate is transparent and colorless in solution, is non-foaming and runs absolutely flat under all conditions. Low pH (alkalinity) makes it easy on the skin. K-7 solutions do not load work wheels, and this means fewer dressings, longer wheel life and a true ground finish. Write for further details today.

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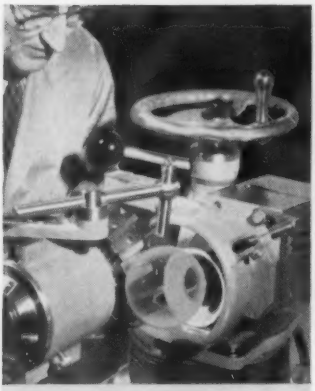
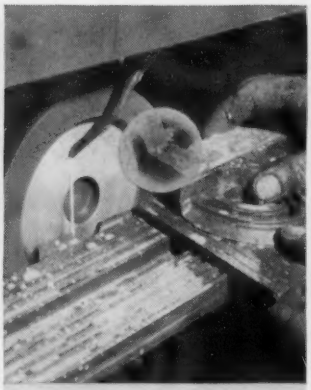
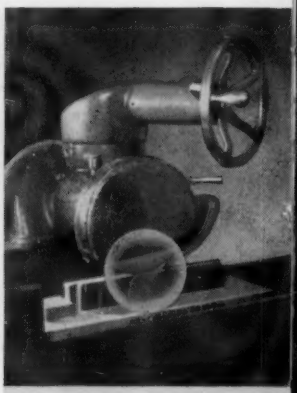


Tool Sharpening



Carbide Grinding



Surface Grinding

...with precision processed,

Norton makes wheels for every grinding job in your tool room — and precision-processes them on the most advanced equipment and with the most experienced "know-how" in the field. The result is precise wheel duplication, longer wheel life, and the same money-saving "Touch of Gold" performance every time you re-order.

Top performers from the 100% line of Norton wheels for tool room grinding include:

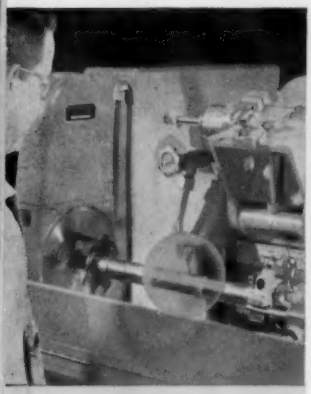
G Bond Wheels. Made with the most efficient vitrified bond ever produced for precision and semi-precision grinding. Use G Bond wheels in the exclusive 32 ALUNDUM* abrasive, 38 ALUNDUM abrasive or 19 ALUNDUM abrasive.

Diamond Wheels by Norton are the recognized "Crown Jewels" for carbide grinding. Made in the regular B resinoid bond for wet grinding and the B6 resinoid bond for dry grinding. (For many carbide grinding jobs, K Bond wheels in CRYSTOLON* abrasive are an excellent investment.)

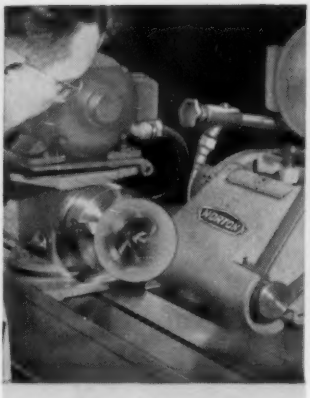
Cut-Off Wheels made in abrasive-and-bond combinations for all tool room applications.

Remember: Norton offers you the longest experience in both grinding machines and

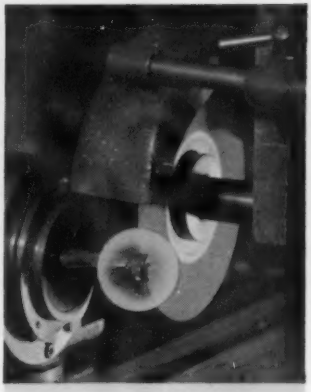
every tool room grinding job



Cylindrical Grinding



Internal Grinding



Cutting-Off

precision duplicated Norton wheels

grinding wheels to help you produce more at lower cost. See your Norton Distributor for the new, revised handbook on tool room grinding. Or write to the nearest District Office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

NORTON
ABRASIVES

Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories
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W-1732

*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

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NEW *Grip-Tip* CENTERS

(Patented)

CHECK THESE *Grip-Tip* FEATURES

- Long-Life Holders
- Replaceable Carbide Tips
- Easy Insertion and Removal of Male or Female Tips
- Reduced Machine Down-Time
- Lower Cost for Replacement of Carbide Tips
- Carbide Tips Accurate to .0003"
- No Regrinding of Holder
- Carbide Tips Are Easy and Inexpensive to Stock
- Reduced Regrinding Time
- Longer Diamond Wheel Life

with

REPLACEABLE CARBIDE TIPS

Grip-Tip Centers are specifically designed to substantially reduce your replacement costs and machine down-time for regrinding or replacement of worn or chipped centers.

Male or female carbide tips are inserted or removed from the tool steel holders by simply turning a screw. The unique clamping action of holders on tips is positive and quick . . . you save replacement time with Grip-Tip Centers.

The life of Grip-Tip holders is practically unlimited, for, only the dull or chipped carbide tips are reground. Because the steel holder is not ground when sharpening the carbide tip there is less clogging and longer life for your diamond wheels. Also, the relatively inexpensive double end tips in both male and female types can be stocked with a minimum investment . . . Grip-Tip Centers reduce tool and inventory costs.

Grip-Tip Centers increase your production by permitting full utilization of machine tools. It takes but a minute to remove old carbide tip and replace with a new one . . . machine down-time is less with Grip-Tip Centers.

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modern machine shop

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- Maximum Diameter—5/8 inch.
- For fast-production, multi-spindle machines.
- Specially heat-treated, high speed steel.
- With back taper or radial relief.
- Made by specialists in the design of small tools.

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NEW . . .

Today's Lowest-priced "Working" Gage Blocks!

Johansson Thrift Blocks

±.000008" accuracy and parallelism
1.0 to 1.5 micro-inch RMS
surface finish .000006" flatness

BUY THROUGH YOUR LOCAL DISTRIBUTOR

TWO SETS AVAILABLE

Set No. 1 (84 blocks)
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over 150,000 different gaging sizes

Brown & Sharpe

MILLING, GRINDING, AND SCREW MACHINES • CUTTERS
MACHINE TOOL ACCESSORIES • PRECISION TOOLS • PUMPS

Now high precision standards for use "on-the-job" are practical in any shop! New Brown & Sharpe "Thrifty Jo's" give you "Class B" accuracy at greatly reduced cost. You can use "Thrifty Jo's" to check the accuracy of your regular working gages. Or, you can assemble them into actual working gages, using Brown & Sharpe Jo-Block Accessories. They save time and money on literally hundreds of different measurements in every department.

Brown & Sharpe "Thrifty Jo's" are available at your Brown & Sharpe Distributors. In sets of 84 or 36 blocks, or as individual, standard sizes. Thrift carbide wear blocks available for use as outer blocks. Send for Catalog of complete Jo-Block Line. Brown & Sharpe Mfg. Co., Providence, R. I.

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IMMEDIATELY AVAILABLE!

HIGH SPEED 1-TON DENISON HYDRAULIC *MULTIPRESS*®

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SAVE ON TOOLING COSTS FOR

- marking plastics, novelties, and leather
- assembling electronic parts
- trimming die castings
- plus assembling, marking, broaching, swaging, compacting

Cost ONLY $395.00 F. O. B. Factory

Delivery subject to prior sale

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DENISON ENGINEERING DIVISION

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extra!

ALL ABOUT THE LATEST BENDING METHODS

Let Pedrick show you how the latest methods of bending pipe, tube and structural metal—on a job or production basis—can save you money.

For full information on Pedrick Production Benders, write PEDRICK TOOL AND MACHINE CO., 3640 N. Lawrence St., Phila. 40, Pa. Dept. 5.

FREE "PEDRICK LINE" BULLETIN.
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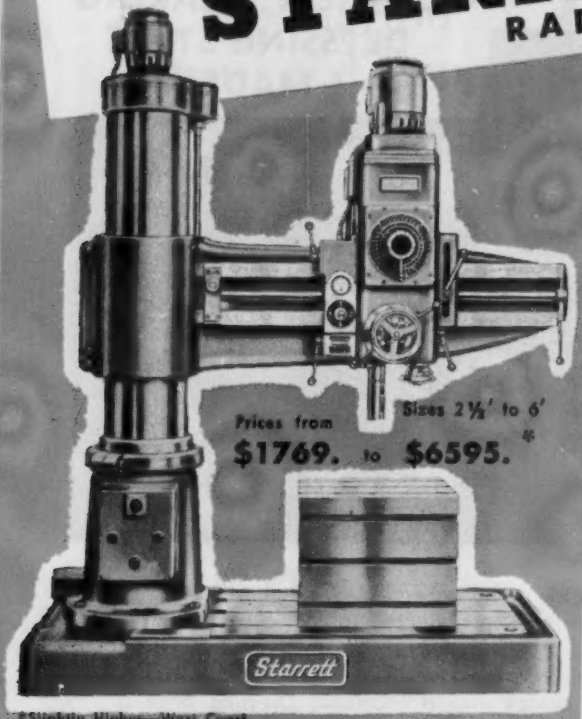

Prices from $1769. to $6595.*

Sizes 2½' to 6'

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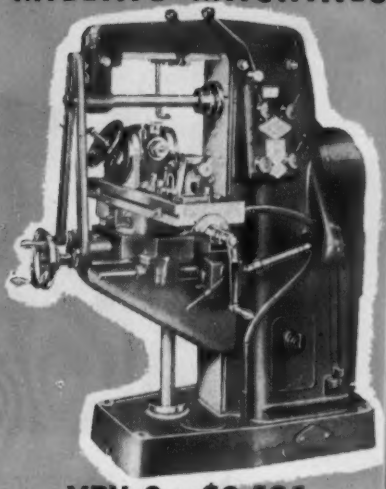
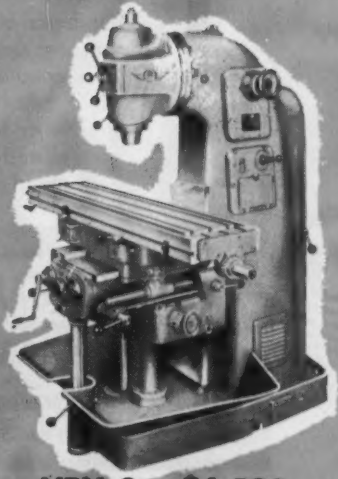
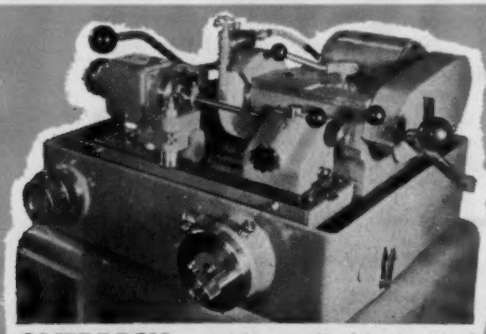
Horizontal, Vertical, Combination
MILLING MACHINES



VPU-0 $2,595.



VPV-2 $6,590.



OVERBECK precision cylindrical grinders
Sizes 1 9/16" O.D. x 4¾"

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See page 345

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LONGEST WEARING DRESSING STICK MADE

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Making better products... to make your products better

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NORBIDE® ... The hardest manufactured abrasive commercially available!

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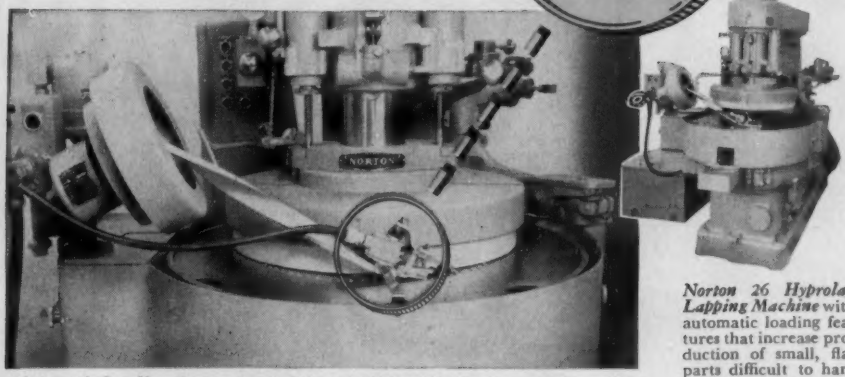
On small, flat parts the Norton Thru-Feed Lapper

brings 4 to 1 savings



Automatic Loading Arrangement of Norton 26 Hyprolap lapping machine makes sure parts are in correct position before entering feeding trough . . . prevents ganging up . . . directs work in a path that assures even lap wear.

Norton 26 Hyprolap Lapping Machine with automatic loading features that increase production of small, flat parts difficult to handle manually as much as 4 to 1 . . . as many as 8000 pcs/hr.

*NEW, built-in automatic loading adds extra advantages to Norton 26 Hyprolap**

Now you can make 4-to-1 savings in lapping small parts . . . and get top-quality results on every job. Investigate new Norton 26 Hyprolap lapping machines with the exclusive built-in thru-feed mechanism.

Here's why:

1. You speed up production. Loading and lapping operations handle parts as fast as 8,000 pieces per hour.

2. You cut handling. Loading and unloading are completely automatic.

3. You reduce downtime. Work path traverses the entire working surface of each lap . . . promoting even wear . . . reducing the frequency of lap dressing.

4. You cut out operations. This lapper removes stock down to .0002" tolerances . . . makes surfaces parallel to .000025" . . . in many instances without pre-grinding of parts.

5. You use less skilled help. Filling feed hoppers and removing finished-work baskets are the only manual operations.

No wonder 4-to-1 savings are a matter of record with the new Norton Hyprolap with built-in automatic loading!

Send for Bulletin 852-7. Also submit samples of your work for production estimates. Standard hopper-feed Hyprolap machines take work up to 1¼" diameter. Modifications handle larger work. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

To Economize, Modernize With NEW

NORTON

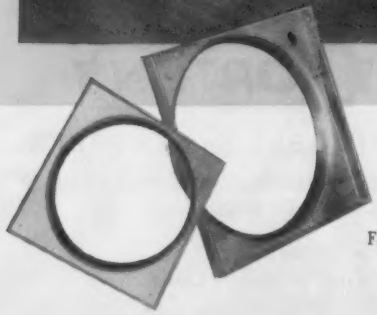
GRINDERS and LAPPERS

Making better products . . . to make other products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

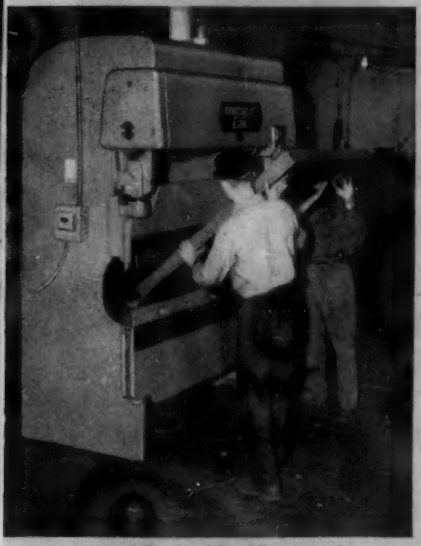
For more data circle **258** on Reader Service Card

This accurate Cincinnati



Fan casings.

Press Brake saves money and time...



Photos courtesy of Anchor Metal Spinning Company.

at **ANCHOR METAL SPINNING CO.**
Dayton, Ohio

Profitable production has been achieved by installing this Cincinnati Press Brake.

Accurate flanging of fan housings is done rapidly while meeting the rigid requirements for squareness. Operations on different sizes and gauges of materials are performed with ease. Parts for assembly are ready on time and smooth shop operation maintained.

Write for Bulletin "2 New Cincinnati Press Brakes" for complete information on these versatile machines.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

CINCINNATI

Photo courtesy Champion Spark Plug Company.

Free-Machining Armco Stainless

Chosen For Jet Engine Spark Plugs

Free-machining Armco 18-10 Cb-Ta FM replaced a high-nickel alloy in the barrel around the ceramic on this jet engine spark plug. Here's why:

It machines better, costs less, and stands up to heat in the burner of the jet engine.

Get What You Need At Armco

Whatever your needs in stainless bar stock, you'll find the grade you want at Armco. At the same time, you'll get high quality, consistently-machinable stainless steel. This means fewer rejects—more profit.

For complete information about Armco Stainless Steel bar and wire, call the Armco Sales Office near you. For one-day delivery service, contact your nearby Armco Distributor. Just write us for his name if you don't know him.

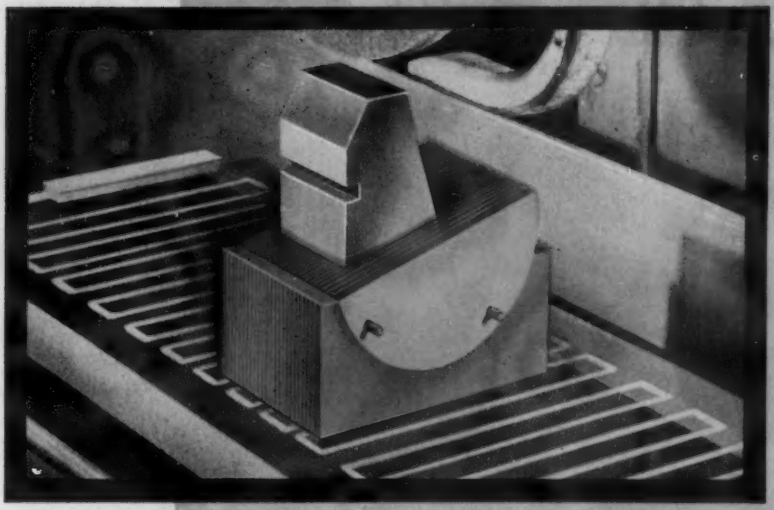
ARMCO STEEL CORPORATION

2066 CURTIS STREET, MIDDLETOWN, OHIO

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

For more data circle **261** on Reader Service Card

precision setup for precision grinding



with the ANTON

ADJUSTABLE MAGNETIC WORKHOLDER

This revolutionary, new holding block saves countless dollars and man-hours for toolmakers and machinists. The old time-consuming and complicated setups for angular grinding can now be discarded. You can now grind any desired angle with ease, using only a protractor and planer gauge to set or reset the holding block. An invaluable aid to anyone whose tooling requirements must meet the modern demands of quantity and quality production. And, it's inexpensive!

Write today for complete technical data to:

Anton Machine Works

1226 Flushing Avenue, Brooklyn 37, New York

Standard & Magnetic Parallels • Standard & Adjustable V-Blocks • Diamond Holders • Milled Blanks

For more data circle 262 on Reader Service Card

TAPS *by* Card

The CARD Quality

When you specify Taps or Gages *by Card*, you know you're getting the finest. Card's long experience in the manufacture of precision tools is your guarantee of satisfaction. In every industry the superior performance of Card taps and gages is speeding production, helping to turn out better products faster.

Presenting the Symbol of Service

YOUR CARD DISTRIBUTOR

S. W. CARD MANUFACTURING CO., Mansfield, Massachusetts
Division of UNION TWIST DRILL COMPANY

GAGES *by* Card

TAPS · DIES · SCREW PLATES · GAGES

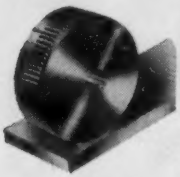
For more data circle **263** on Reader Service Card

MATTHEWS MARKING *Products*

"every need for every industry"

Full line of stamping and embossing steel dies in any size to suit your needs.

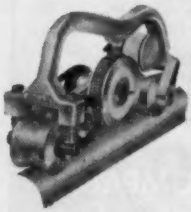
Matthews General Purpose Machines mark round or flat parts up to 6" diameter-models from hand operated to pneumatic-hydraulic to mark up to 800 pieces per hour.



Roller dies engraved to your specifications–may be mortised for interchangeable inserts.

High production machines produce thousands of marks per hour on round, solid or hollow parts. Fully automatic.

6 styles of Standard Steel Type Holders for light to heavy duty service.



Portable and motorized bar, tube and sheet Printingunits, with permanent or soluble inks for every application.

JAS. H. MATTHEWS & CO.

3946 FORBES ST.

PITTSBURGH 13, PA.

BOSTON CHICAGO PHILADELPHIA CLIFTON, N. J.

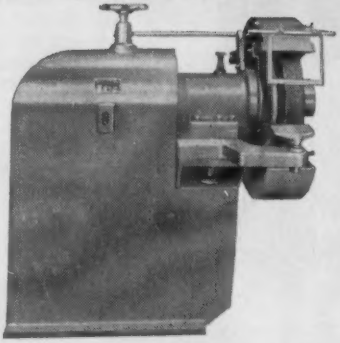
Write for literature and catalogs for your applications.

For more data circle **264** on Reader Service Card

America's Outstanding Grinders!

Maximum performance . . . production . . . economy . . . quality . . . speed . . . with minimum cost of operation and maintenance

UNITED STATES ELECTRICAL TOOL COMPANY GRINDERS
for every purpose . . . for every industry



NOW NEW! SINGLE END VARI-SPEED SNAGGING GRINDER 7½ TO 20 HP MODEL 61 VS

Ideal stub user. Constant peripheral speed regardless of wheel diameter for increased production and longer wheel life. For vitrified or high speed grinding wheels.

GENERAL PURPOSE FLOOR GRINDER MODEL 500

Totally enclosed motor, 1 to 5 hp. Push button starting with overload protection. Ball bearings enclosed in dust-tight housings. Enclosed adjustable wheel guards.

You need these tools . . .

Write for catalog on your firm letterhead

BUFFERS
Bench
Floor
GRINDERS
Angle plate
Bench
Brake drum
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Portable
Precision
Swing Frame
Tool post
Vertical Spindle
Wet
DRILLS
Portable electric
DUST COLLECTORS
HEAT GUNS
DRILL STANDS
Post bracket
NUT SETTERS
SCREW DRIVERS
POLISHERS
Portable
Bench
Floor
SANDERS
Disc, portable
VALVE SEAT GRINDERS
and many other tools

THE UNITED STATES ELECTRICAL TOOL COMPANY
3646 Llewellyn Street, Cincinnati 23, Ohio

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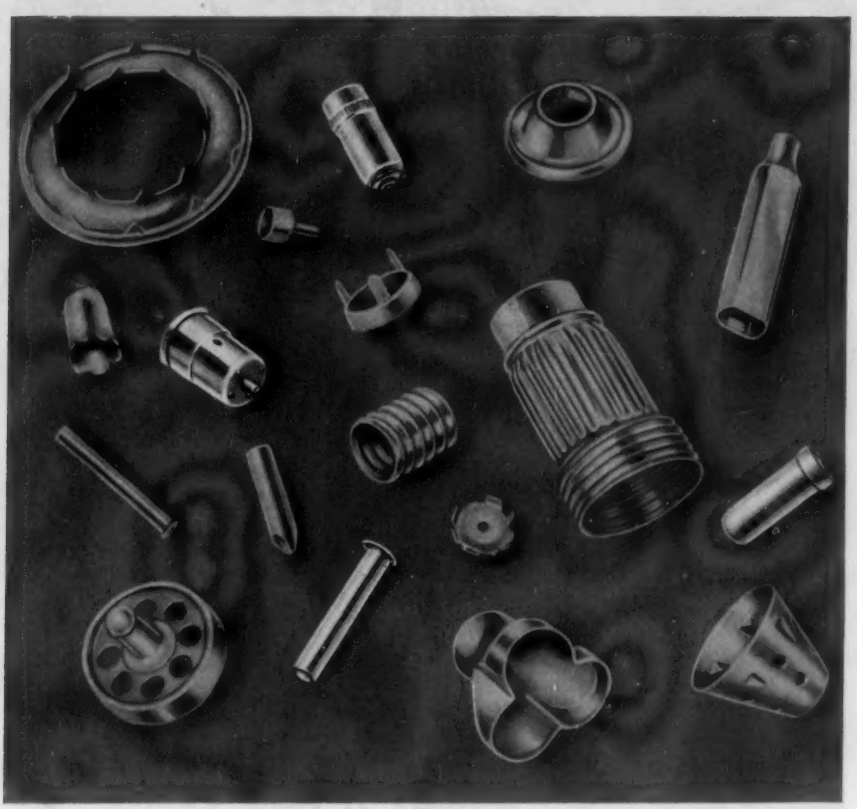
A SHORT CUT TO A FINISHED PRODUCT



SAVE YOURSELF TIME AND TOOL CHARGES

with Anaconda multiple-plunger press products—in a wide choice of metals

If you need parts like these in quantity, The American Brass Company can save you time and money. Through its specialized experience—and thousands of stock tools—it may save tool charges, too.

Ferrules, grommets, eyelets, deep-drawn cups and shells, and thousands of other intricate, close-tolerance parts made from strip metal are everyday business. American Brass Company design engineers and toolmakers have earned an enviable reputation for cutting costs and performing the almost impossible in design and production.

Your choice of metal: Such fabricated products can be furnished in copper, brass, bronze, nickel silver, nickel, iron, steel, stainless steel, and aluminum — in a wide variety of finishes.

Standard products: For a selection of more than 1000 eyelets of common sizes and styles, as well as eyelets kept in stock for immediate shipment, write for Catalog BG-1.

Special products: Just send a sample, drawing, or description, together with the quantity you need, the metal to be used, and other pertinent information. Address: The American Brass Company, Fabricated Metal Goods Division, Waterbury 20, Conn.

ANACONDA®
MULTIPLE-PLUNGER PRESS PRODUCTS

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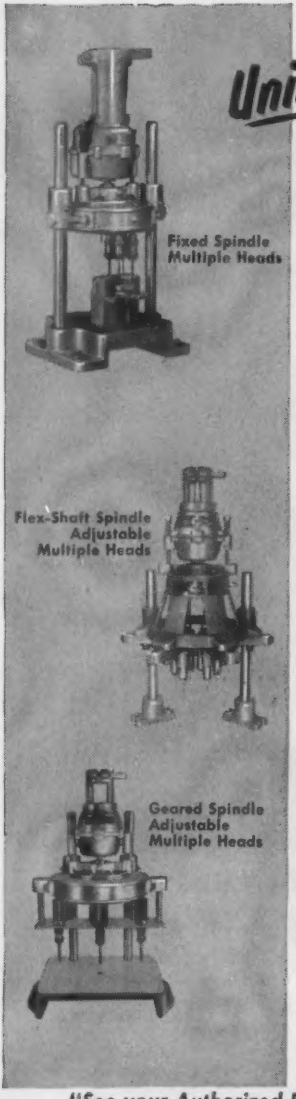


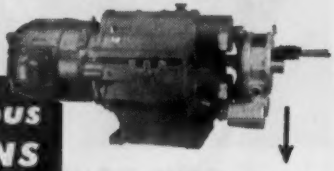
Unit engineered for greater small hole drilling and tapping production!

ETTCO-EMRICK MULTIPLE HEADS

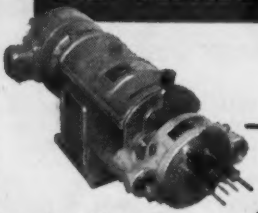
BOTH the head and workholder are designed *as a unit* to your requirements to give you a *complete* high production system capable of maintaining highest production rates on your drill press. Thus, you are not only assured of drilling and tapping the maximum number of holes at each stroke but — what is just as important — the fastest handling of the parts.

SEE FOR YOURSELF. Send samples or drawings of your parts with basic production data. We'll give you recommendations and prices.

For details, ask for our Multiple Head Bulletins.



The famous T-D TWINS



Automatic Drilling Unit

Completely self-contained with exclusive features that mean better work at lower cost.

Automatic Lead Screw Tapping Unit

Used with Ettco-Emrick Multiple Heads, it's the ultimate in fast, automatic precision tapping.

"See your Authorized Ettco Distributor"

ETTCO TOOL CO., INC.
598 Johnson Ave., Brooklyn 37, N. Y.
Chicago • Detroit • Los Angeles • Indianapolis

Ettco-Emrick
the right equipment for every small hole drilling and tapping need.

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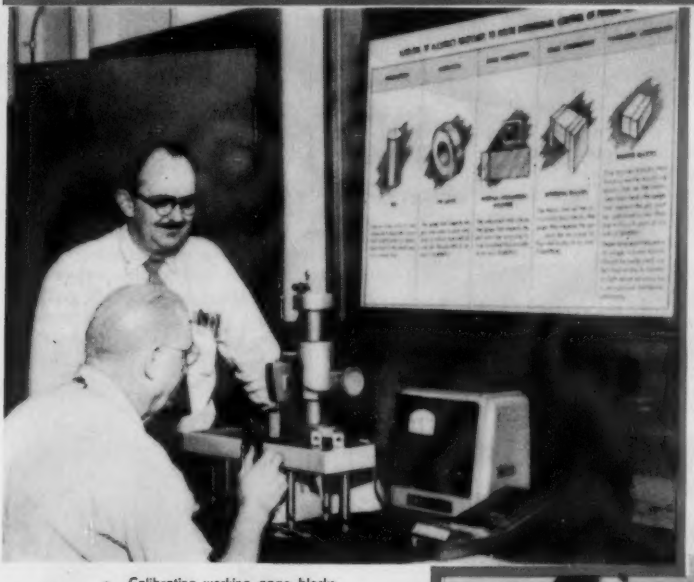
SHEFFIELD MEASURING INSTRUMENTS AID GUIDED MISSILE PROGRAM



▲ Calibrating working gage blocks on a Sheffield Electronic Comparator.

Missile guidance development is a field in which dimensional precision must rate top priority.

Chance Vought Aircraft Inc., a long recognized leader in this field maintains its own well equipped gage laboratory for the constant surveillance of dimensional standards. Here all shop gage blocks are periodically calibrated on a Sheffield Electronic Comparator. Ball bearing race clearances are checked to a "tenth" on a Sheffield Radial Play Gage.

If your work calls for close tolerances, write for technical bulletins on instruments such as these to The Sheffield Corporation, Dayton 1, Ohio, U.S.A. Dept. 12.

▲ Checking ball bearings on a Sheffield Radial Play Gage.

GOLDEN ANNIVERSARY

SHEFFIELD

manufacture and measurement for mankind

7564

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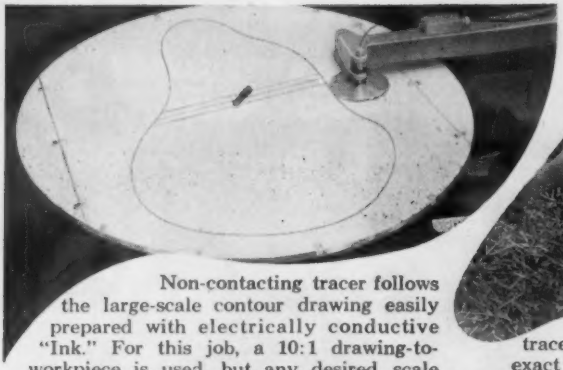
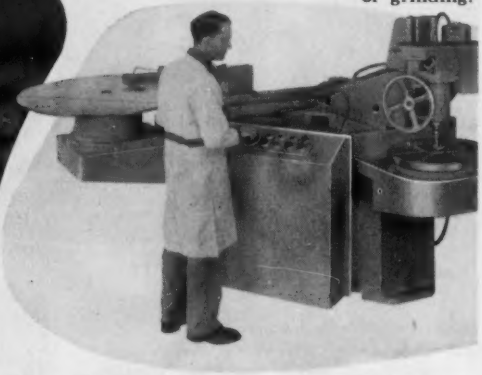


Non-contacting tracer follows the large-scale contour drawing easily prepared with electrically conductive "Ink." For this job, a 10:1 drawing-to-workpiece is used, but any desired scale such as 20:1 or higher can be selected.

Following the action of the tracer, the cutter reproduces the exact shape of the drawing on the workpiece. Due to the large reduction ratio, any errors in the drawing are reduced in the same proportion, resulting in accurate milling or grinding.

mill or grind IRREGULAR CONTOURS *without* expensive models *or* complex special tooling



- mill or grind directly from simple line drawings
- extremely accurate
- unique, non-contacting tracer control

MODEL 104 *Electronic* CAM and TEMPLATE MACHINE

IF YOU ARE PRODUCING . . . external or internal cams, templates, blanking punches or dies of complex, irregular shape —

WRITE TODAY FOR CIRCULAR NO. 579-1 . . . fully describing the Model 104 Cam and Template Machine. See how you can achieve greater accuracy, faster production and lower costs than ever before.

Manufactured by the New England Machine & Tool Company. Sales engineering and maintenance service through Pratt & Whitney.

PRATT & WHITNEY COMPANY
INCORPORATED
25 Charter Oak Boulevard, West Hartford 1, Conn.
Direct Factory Representatives in Principal Cities
MACHINE TOOLS • GAGES • CUTTING TOOLS

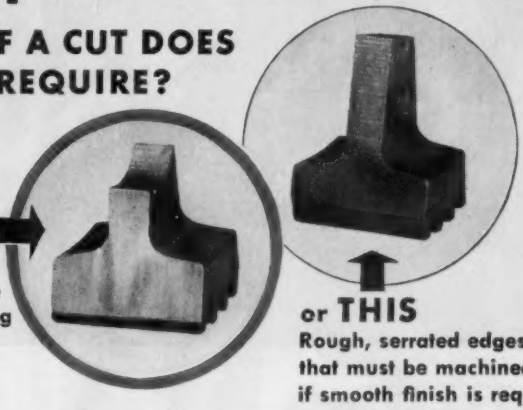
For more data circle 269 on Reader Service Card

Abrasive Cutting

the best way to cut many materials
the only way to cut some

Campbell Cut-Off Machines

WHAT KIND OF A CUT DOES YOUR JOB REQUIRE?



THIS
Clean, smooth edges that require no further finishing

or THIS
Rough, serrated edges that must be machined if smooth finish is required

• The smooth cut—made on a CAMPBELL Oscillating Wet Abrasive Cut-Off Machine and the just-right ALLISON Abrasive Wheel for the job—saves a grinding operation at a Midwest gear plant.

Another combination of CAMPBELL Cut-Off Machine and ALLISON Wheel cuts stainless steel tube twice as fast as by other methods for a large aircraft manufacturer.

Can you cut tough K Monel, 4¾" dia., in two minutes per cut by present methods? Whatever your problem, our abrasive cutting specialists can improve your cutting operation and save you money.

OSCILLATION makes these big cuts with speed and economy

• The cross section of gear teeth (*shown left above*) is cut smooth, fine-finished and ready for metallurgical study.

It results from the wet cut of an Oscillating CAMPBELL Abrasive Cut-Off Machine with abundant coolant applied just where it does the most good. The Oscillation of the ALLISON Abrasive Wheel, the right one for the job, handles big cuts like this with speed and economy.

If your cutting involves alloy or high carbon steel, this CAMPBELL-ALLISON combination just can't be beat.

ACCO

TRADE MARK

Let us send you this book

Campbell Machine Division
AMERICAN CHAIN & CABLE

931 Connecticut Avenue, Bridgeport 2, Connecticut

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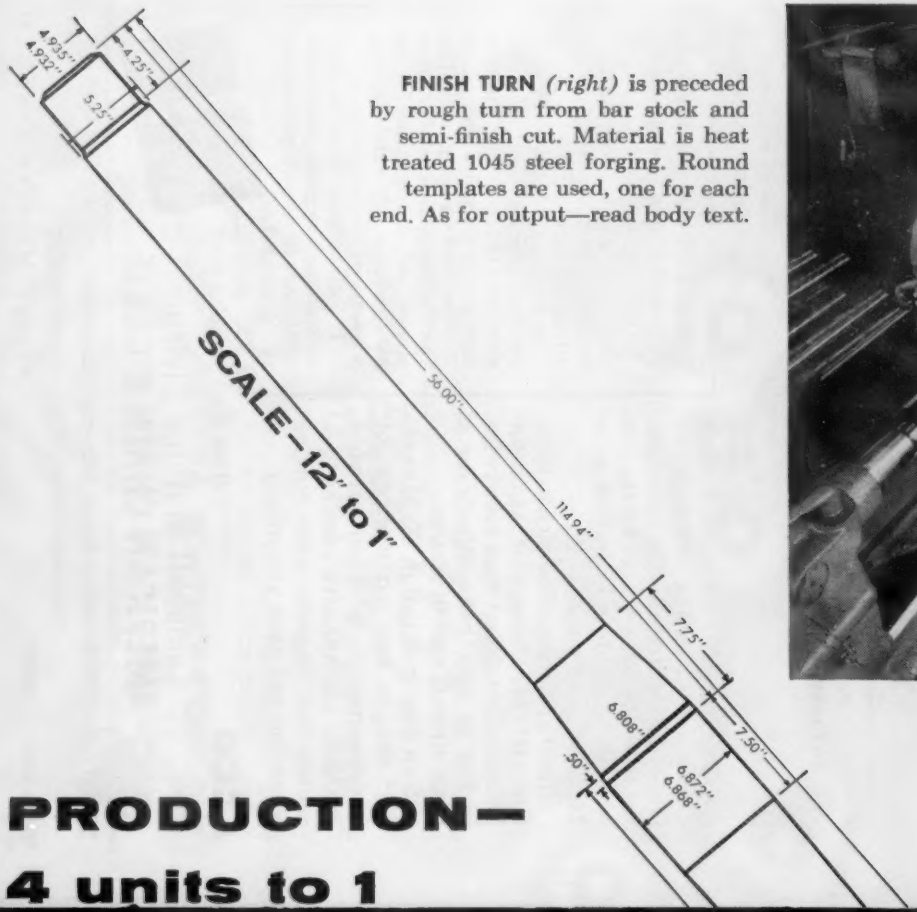


FINISH TURN *(right)* is preceded by rough turn from bar stock and semi-finish cut. Material is heat treated 1045 steel forging. Round templates are used, one for each end. As for output—read body text.

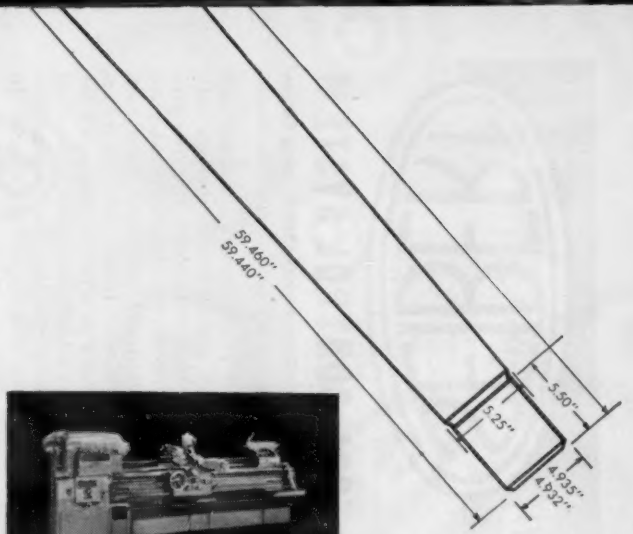
PRODUCTION—
4 units to 1

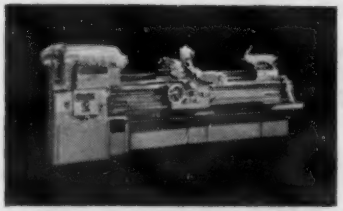
Could be quite a turning problem, this piece—almost 115″ long, with 44″ and 46″ tapered sections! But not, reports the user, when turned on his Air-Gage Tracer-equipped Monarch 16″ Series 61 Engine Lathe.

Not only is he getting 4 times the output possible with a conventional lathe, but maintaining a degree of accuracy and finish not otherwise obtainable. With carbide tooling, he's holding a tolerance of ±.0015″ and securing a surface finish of 32 micro inches.

Reason for the holding of such accuracy on the Monarch is the super-sensitivity of the Air-Gage Tracer. The exclusive combination of air and oil control found on this device requires a stylus pressure of only 5 to 6 ounces against the template. Add to this the further design feature of both air and oil in constant motion and you have instantaneous power cylinder response to the slightest change in template shape.

Now—about your turning requirements! We've got the machines and the tracer controls to better almost any conventional setup. Why not bet a three cent stamp against almost unlimited production improvement? Let us prove it . . . ***The Monarch Machine Tool Company, Sidney, Ohio.***





Monarch

ACCURACY • ECONOMY • LONG LIFE

TURNING MACHINES

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

Announcing New SEIBERT

TOOL CONTROL SYSTEM

Tool Board, Cyclometers, Pre-Setting Gages
Individually Designed to Suit Your Needs

View of typical 9-section unit equipped with pre-setting gages. All units built under licensee patent #2679038.

Now, from Seibert, you can obtain tool control boards that are individually designed to suit your production requirements. Panels are subdivided into sections for each type of tool, and divisions are arranged as required with space for two sets of tools for each job. Tool panels and benches are available in 3, 6, 9 or 12-foot lengths. In addition, you can now obtain from Seibert pre-setting gages of all types and also optional equipment such as plastic cyclometer covers with locks, drawers, shelves, etc., to suit your specific needs.

INCREASES PRODUCTION EFFICIENCY

Tool Control Boards are a tested and proven method of increasing the efficiency of production machine tools. They provide a system of scheduling tool changes according to pre-determined efficiency standards. You cut down-time, insure longer tool life, reduce tool breakage, and lower scrap losses.

PRODUCTION ADVANTAGES

- Reduces down-time, provides an efficient system of programming tool changes.
- Automatically controls machining operations; provides visual record of used life of each tool.
- Assures more efficient use of tools, reduces breakage and scrap losses.
- Provides storage and complete facilities for pre-setting tools at the machine.

Write for Additional Data

Get the complete story on new Seibert Control System. Specify circular M-10, or ask a Seibert Sales Engineer to survey your requirements.

SEIBERT & SONS, INC. CHENOA, ILLINOIS

Quality MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

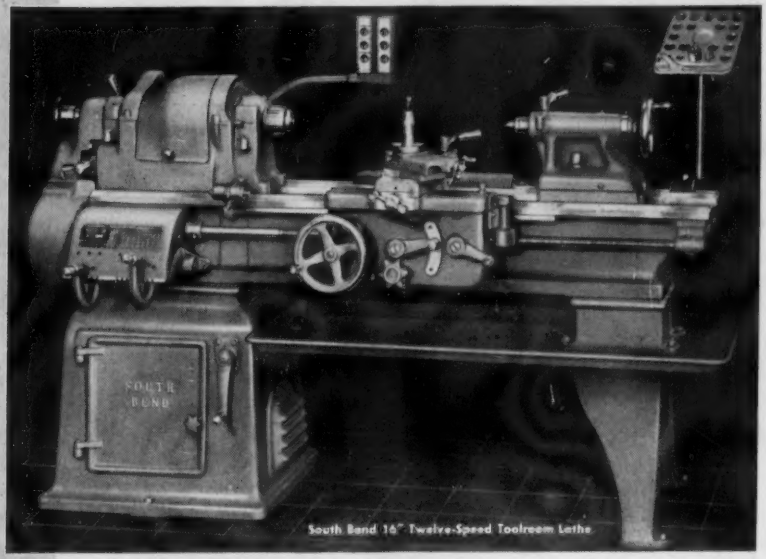
For more data circle **273** on Reader Service Card

Cuts Machining Time

The wide range of spindle speeds on this new lathe cuts machining time because the operator quickly selects the right speed for each operation. Pushbutton control provides a fast change from any high speed to the corresponding low speed. This versatility is further increased by 48 choices of longitudinal and cross feeds which insure maximum efficiency on every job.

SOUTH BEND 12 SPEED LATHE

CL8155C, illustrated below, f.o.b. factory, less motor and controls. Time payment terms available. **$2806.00**



South Bend 16" Twelve-Speed Toolroom Lathe

SPECIFICATIONS

Spindle Speeds (approx.) **Direct:** high range 300, 550, 945; low range 150, 278, 475. **Back gear drive:** high range 32, 70, 118; low range 20, 33, 60.
Spindle Bore — 1⅜".
Swing over bed and saddle wings — 16¼".
Swing over saddle cross slide — 9⅝".
Distance between centers — 33¼", 45¼", 57¼", 81¼", 105¼".
Collet Capacity — 1" maximum.
Longitudinal Feeds — 48 R.H. or L.H., .0015" to .0841".
Cross Feeds — 48, .0006" to .0315".
Thread Pitches — 48, 4 to 224 per inch.

PLEASE SEND INFORMATION CHECKED:

☐ 9" and 10" BENCH LATHES ☐ 13" to 16-36" FLOOR LATHES ☐ DRILL PRESSES ☐ ½" & 1" Collet TURRET LATHES ☐ TOOL GRINDERS ☐ 7" BENCH SHAPERS ☐ MILLING MACHINES

Name _____ Street _____

City _____ State _____

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

For more data circle **274** on Reader Service Card

How to GET THE JOB DONE at low, low cost!

benchmaster

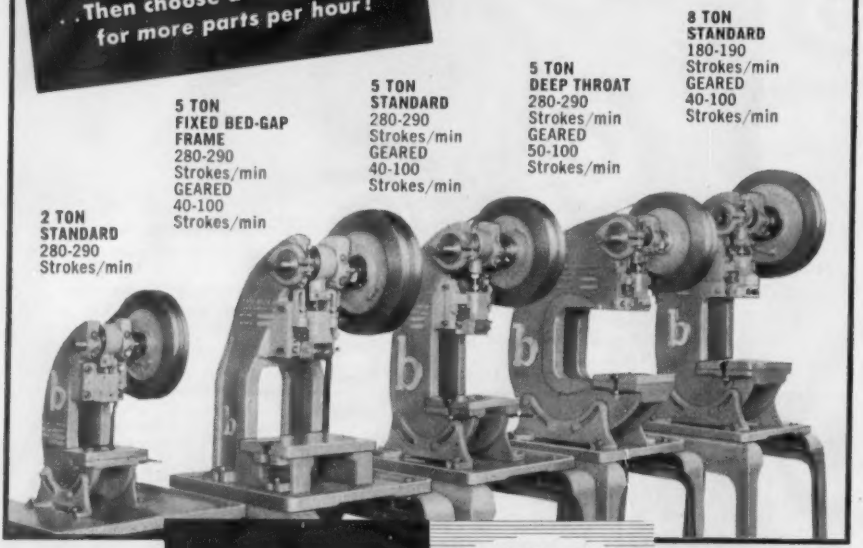
world standard in small presses

Manufacturers all over the world have found Benchmaster Punch Presses the answer to *high production with minimum investment!* With their *compactness requiring little floor area, fast crankshaft speeds* and *high number of strokes per minute*, any Benchmaster will tremendously outproduce big presses on work where high tonnage is not necessary.

If your job is *beyond* the tonnage capacity of a single Benchmaster, investigate our Multiple Ram Presses... 2 or more Benchmasters operating in tandem off a single crankshaft. You get *more bed area, progressive die operation* with *individual die stations, lower die cost* and *easier die maintenance*... at savings up to 50% in press cost!

DON'T OVERLOOK THE POSSIBILITY OF A SPECIAL BENCHMASTER designed to accommodate your specific job. Ask for our recommendations!

CHECK YOUR BIG PRESS PRODUCTION AGAINST THESE OUTPUTS ...Then choose a Benchmaster for more parts per hour!



FREE CATALOG

benchmaster

World's largest manufacturer of small punch presses and mills.

1835 West Rosecrans
Gardena, California

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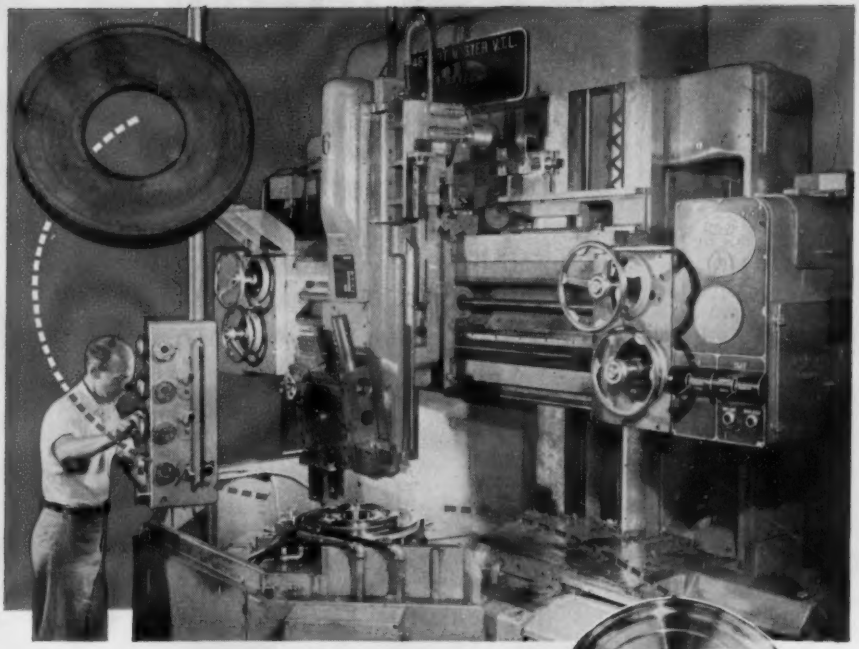


"To produce quality parts in quantity . . .

Nothing beats Man·Au·Trol"

This statement by Mr. W. Mason Williams, Manufacturing Manager of the Jet Division, Thompson Products Inc., Cleveland, Ohio, is based on ten years of experience with Man-Au-Trol.

"If it hadn't been for Man-Au-Trol" Mr. Williams continues, "we would still be turning out aircraft engine components on manually-operated machines. Man-Au-Trol, particularly when tooled with better cutting tools, has enabled us to turn out at least *five times as many compressor disc and turbine discs per shift* as we produced on hand-operated equipment."

BULLARD

You, too, can apply to your machining problems the many advantages offered by Man-Au-Trol, Model 75 — just call your nearest Bullard Sales Office, Distributor or write for catalog to

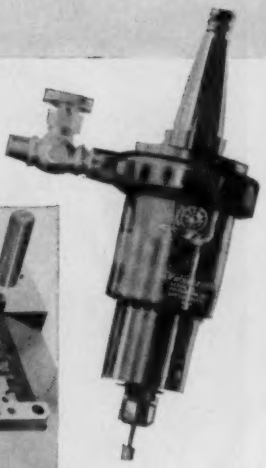
THE BULLARD COMPANY

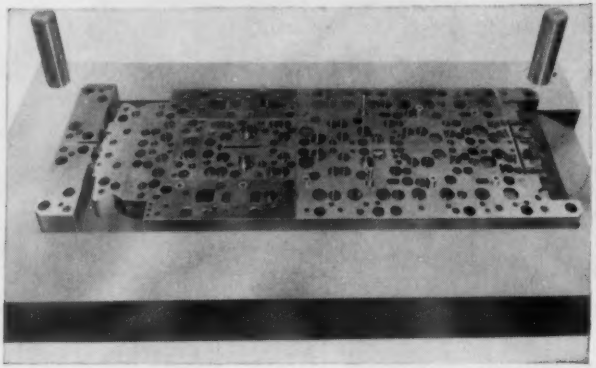
BRIDGEPORT 9, CONNECTICUT

For more data circle **276** on Reader Service Card

Holes JIG GROUND with *Vulcanaire*

Provide yourself with this inexpensive* instrument for use on your present equipment and JIG GRIND with a guarantee.





A seven station die from Vulcan's contract Tool Room (Your Tool Room in Dayton).

Standard sized punches and buttons were used. But since forming and piercing operations were involved, hardening of the sections was necessary followed by JIG GRINDING. Result: Close tolerances held easily and perfect progression throughout — another satisfied customer.

***Vulcanaire equipment pays for itself on the first job.**

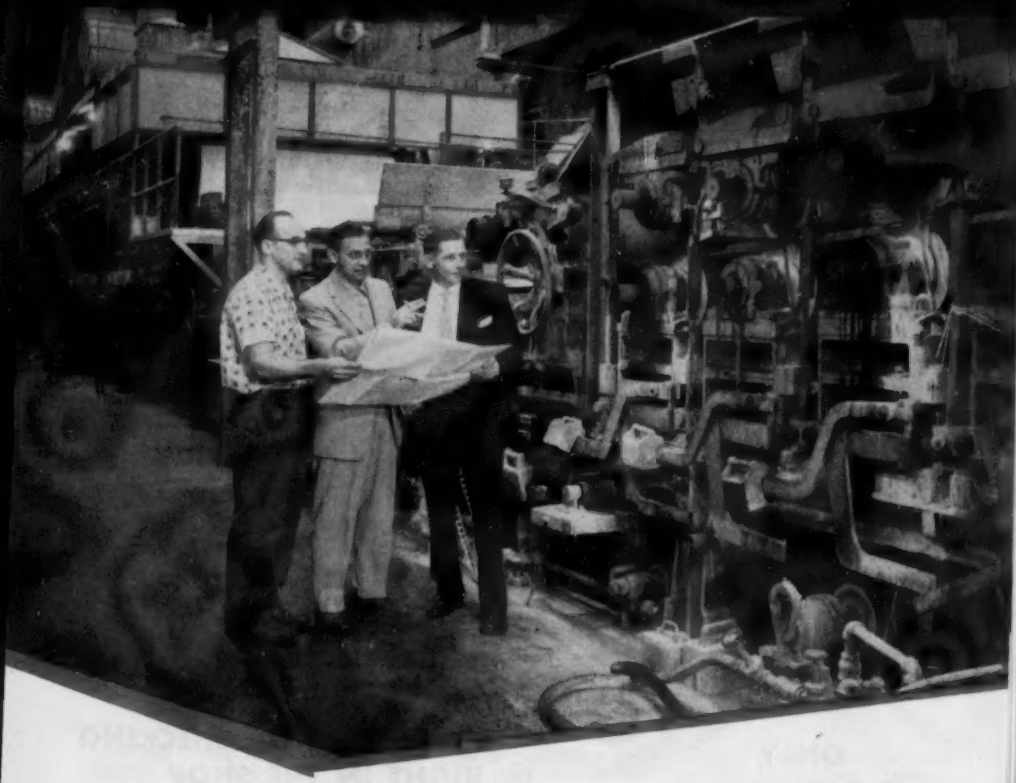
Vulcan's 45th year.

Borrow Vulcan's instructive movie on jig grinding.

Services of YOUR TOOL ROOM in Dayton

Engineering, Processing, Designing . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and Size . . . Vulcanaire Grinding Heads . . . Motorized Rotary Tables . . . Plastic Tooling . . . Vulcanaire Jig Grinders.

VULCAN TOOL CO. • 710 LORAIN AVE. • DAYTON 10, OHIO



how Bearings, Inc. goes to work for ...a boxboard plant

• Here's service with a capital "S" as we see and practice it at Bearings, Inc.! In the photograph are: left, B. H. Weideman, Millwright Foreman; J. A. Rupp, Maintenance Superintendent of the Ohio Boxboard Company plant at Rittman, Ohio, and the Bearings, Inc. salesman, Jack Houser.

They are going over the final phases of a "bearing survey" Jack has been making for the company over the past six months. In this "survey" every bearing in every machine and pump in the Mill Division was located. The make, type, size and fit of over 4,000 antifriction bearings was determined.

The result of the "survey" has been very gratifying to plant executives. Information on every bearing is now at hand, instantly. Inventories of bearings are being steadily reduced and when the records show, to cite only one example, that 6 large, expensive bearings on 3 mills were identical except for a slight and unnecessary variation in internal fit, then no longer do they stock 4 replacements, 2 are plenty!

Do you need this kind of Bearings, Inc. service in your plant. We'll soon tell you . . . all you have to do is ask, no obligation of course.

Rendering bearing service in the territories adjacent to our branches, listed below.

BEARINGS, INC.

OHIO: [illegible] • Cleveland • Columbus • Dayton • Elyria
Lima • Mansfield • Toledo • Youngstown • Zanesville
INDIANA: Ft. Wayne • [illegible] • Muncie • Terre Haute
PENNSYLVANIA: Erie • Johnstown • Philadelphia • Pittsburgh • York
WEST VIRGINIA: Charleston • Huntington • Wheeling
NEW JERSEY: Camden
Subsidiaries: Bolanrol Corp. • Baltimore, Md. • Buffalo, N.Y. •
Kentucky Ball and Roller Bearing Co. • Louisville, Ky.

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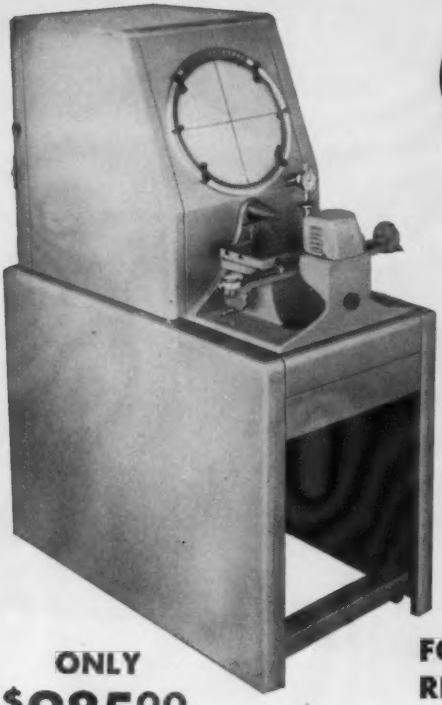

COVEL *Optical* COMPARATOR

New, low-priced contour projector for quick, economical precision inspection

FOR ACCURATE CHECKING RIGHT IN THE SHOP

ONLY $985.00

Large work capacity, sturdy, precision construction and optic arrangement which permits use in bright light in the shop. Ideal for shops using mechanical measuring methods because they haven't been able to afford the luxury of an optical comparator.

SEND TODAY FOR DESCRIPTIVE BULLETIN M-116

COVEL MANUFACTURING COMPANY

BENTON HARBOR, MICHIGAN

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switch

A ~~STITCH~~ IN TIME . . .

If you are trying to patch up holes in your production schedule, then it's high time that you switched to CIMCOOL®, the world's largest selling chemical cutting fluid. Here's how CIMCOOL Standard Concentrate can save you money and increase your production.

- **CIMCOOL INCREASES TOOL LIFE** (thus reducing downtime) through its chemical lubricity.
- **FASTER SPEEDS** and feeds are possible because CIMCOOL cools faster, for it combines friction reduction and cooling capacity in a degree never before attained.
- **CIMCOOL COSTS LESS** than old-fashioned cutting fluids because it lasts longer. It also cuts labor costs for cleaning and changing. It virtually eliminates rancidity and foul odors. Because of its low surface tension and low adhesion to work and chips, there is practically no carry off. And CIMCOOL *is clean*—leaves no slippery film on hands, work or floor.

Consult your CIMCOOL distributor. Or contact us direct. Wire, write or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

®Trade Mark Reg. U.S. Pat. Off.

CIMCOOL CUTTING FLUIDS

CIMCOOL **Concentrate**—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

CIMCOOL **Tapping Compound**—Permits the use of highest tapping speeds and increases tap life amazingly.

CIMPLUS—The transparent grinding fluid with exceptional rust control. Also used for machining cast iron and as a water conditioner with CIMCOOL Concentrate.

CIMCUT **Base Additive**—For jobs requiring an oil-base cutting fluid. Added to mineral oils, it gives an economical mix for higher speeds and feeds.

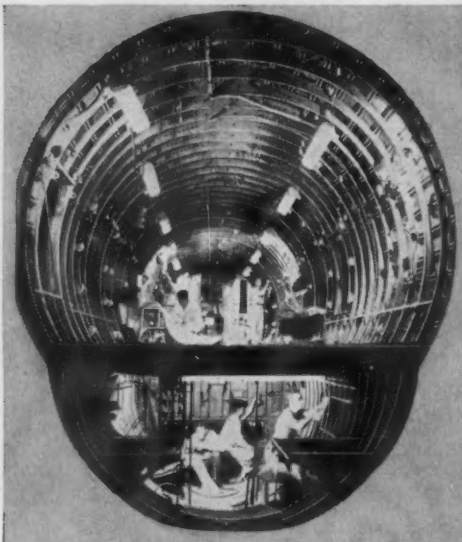
CIMCOOL **Bactericide**—The most effective agent yet developed to overcome rancidity and foul odors.

CIMCOOL **Machine Cleaner**—The two-phase non-corrosive cleaner that removes grit, dirt, slime and oil.

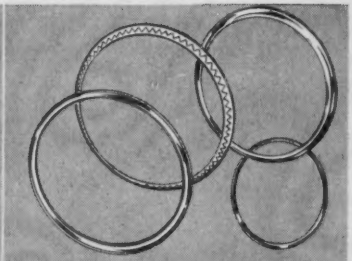
CIMCOOL Cutting Fluids

for 100% *of all metal cutting jobs*

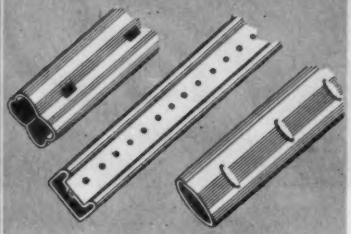
PRODUCTION-PROVED PRODUCTS OF THE CINCINNATI MILLING MACHINE CO.



Cold Roll Formed curved ribs and other structurals used in airplanes, metal buildings, etc.



Rings of any size, for a multitude of different uses.



Roll-formed shapes, notched, perforated, indented or embossed.

1001 Things Now Being Done by COLD ROLL FORMING

The basic function of a Yoder cold roll forming machine is, of course, to convert flat rolled strip or sheets at high speed into mouldings, panels, tubular, channel and other shapes.

Quite often, these shapes need further elaboration before being ready for assembly or installation. They may, for instance, have to be curved, coiled, or made into rings. Or they may need to be perforated at certain intervals of spacing, notched, embossed, or otherwise finished by additional operations. You may want to combine two or more materials into a finished shape, such as carbon steel with stainless, felt, wood, etc.

These and many other things can be done with Yoder machines at little or no extra cost over and above normal conversion costs, simply by providing special attachments, or by auxiliary units installed in line with the forming mill.

Send for a copy of The Yoder Book on Cold Roll Forming.

THE YODER COMPANY
5532 Walworth Ave., Cleveland 2, Ohio

ENGINEERING YODER MANUFACTURING

COLD ROLL FORMING MACHINES
ROTARY SLITTING LINES
PIPE AND TUBE MILLS—Electric Weld

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For metal-cutting specialties

consult these

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specialists

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J. R. Kuntz Company
DETROIT
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CIRCLE R Representatives specialize in metal-cutting problems. Their individual competence is backed by our factory consultation service. Rely on them for specialties to solve the new problems of automation, as well for standard saws and other circular cutting tools. Ask for Catalog N.

We develop special tools to solve problems of automation

SUPREME QUALITY R 1923 - 1956

METAL SLITTING SAWS
COPPER SLITTING SAWS
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CIRCULAR TOOL CO., INC.

PROVIDENCE 5, RHODE ISLAND

Specialists in Circular Cutting Tools Since 1923

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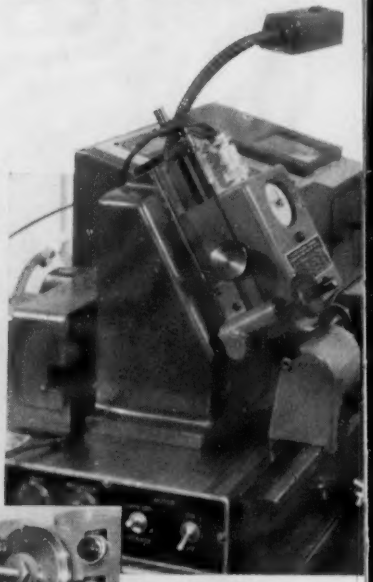
FELLOWS EQUIPMENT FOR FINE-PITCH

1. Gears for a major instrument maker: Fellows 3" Fine-Pitch Gear Shaper turns them out at one-third previous cost, more than twice as fast: 120 finished gears per hour, compared to old rate of 55.

2. Extra precision: Fellows No. 4 Fine-Pitch Gear Shaving Machine makes good gears better with finer finish, minimum backlash, tighter tolerances where desired.



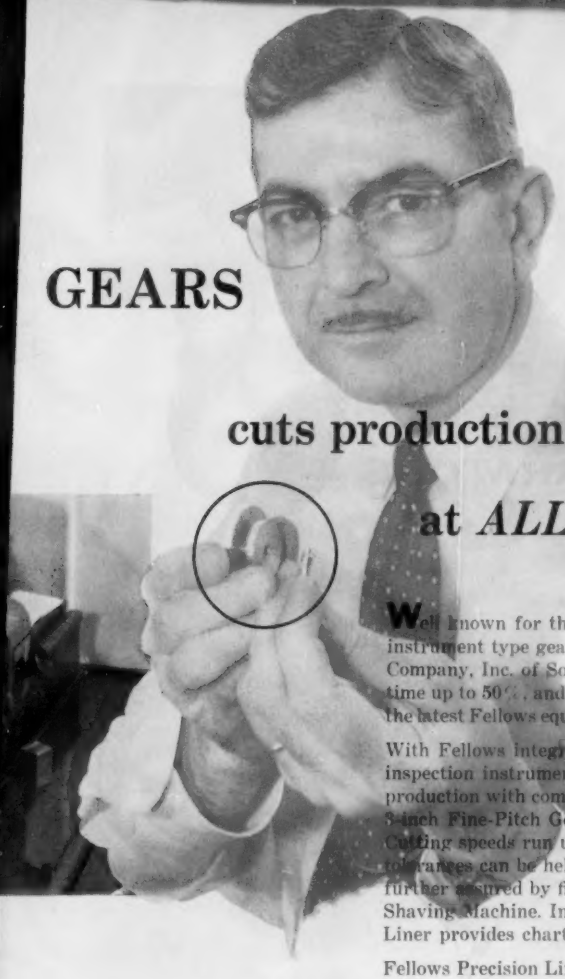
3. Proof: Fellows No. 4 Fine-Pitch Red Liner Inspection Instrument makes a permanent, graphic record of gear quality . . . quick, efficient and accurate.

THE PRECISION LINE

GEARS

cuts production time up to 50%

at *ALLING-LANDER!*



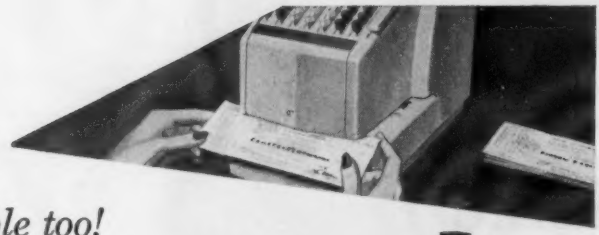
Well known for their excellent service in producing instrument type gears of close tolerance, the Alling-Lander Company, Inc. of Sodus, New York has cut gear production time up to 50%, and unit costs more than half, by using the latest Fellows equipment in their fine-pitch gear department.

With Fellows integrated line of fine-pitch machines and inspection instruments, Alling-Lander gets high-speed production with complete control of gear quality. The Fellows 3-inch Fine-Pitch Gear Shaper is fast and accurate. Cutting speeds run up to 2000 strokes per minute and tolerances can be held to 0.0005". Close-limit tolerances are further assured by finishing on the No. 4 Fine-Pitch Gear Shaving Machine. Inspection on the No. 4 Fine-Pitch Red Liner provides chart-recorded proof of gear accuracy.

Fellows Precision Line also includes other types of gear inspection instruments and a number of models of Gear Shapers for cutting spur and helical gears of larger sizes. Your Fellows representative can give you information about any of them. And, ask him about the Fellows Plan for deferred payment too. Write, wire or phone any of our offices.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 319 Fisher Building, Detroit 2
5835 West North Avenue, Chicago 39
2206 Empire State Building, New York 1
6214 West Manchester Avenue, Los Angeles 45

Fellows *Gear Production Equipment*



. . . and
THIS
CHECK
is valuable too!

TRI·ROLL

THREAD COMPARATORS

produced ONLY *by*

PRATT & WHITNEY

Checking external threads, a P&W Tri-Roll Thread Comparator will save time and increase profits by reducing inspection costs. But this is only part of the story. *Only* Tri-Roll gives you a complete, visual analysis of lead, angle and pitch in one operation . . . *plus* a direct reading of out-of-roundness by rotating the work. *Only* Tri-Roll offers an alternate, critical check of pitch diameter by using two-rib rolls. And ONLY PRATT & WHITNEY can offer you Tri-Roll Thread Comparators with all these advantages.

Write for free copy of Tri-Roll Thread Comparator Circular No. 570.

PRATT & WHITNEY COMPANY
INCORPORATED
25 Charter Oak Boulevard, West Hartford 1, Connecticut
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MACHINE TOOLS • GAGES • CUTTING TOOLS
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save money, minutes, metal

with

B&W MECHANICAL TUBING

CARBON • ALLOY • STAINLESS

Countless hollow parts and products now being made from solid stock can be fabricated more economically from tubing. The hole is there, eliminating heavy drilling with all its attendant waste. And the wide range of sizes, shapes, analyses, finishes and heat-treated conditions in which B&W Mechanical Tubing is available, make it a semi-finished product in itself—reduce all your machining operations to the minimum.

Get the facts on savings from Mr. Tubes, your link to B&W and your local B&W tubing distributor.

Write for Guide to the Use of Seamless Mechanical Tubing, Technical Bulletin MMS.

B&W TUBULAR PRODUCTS DIVISION

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa. and Milwaukee, Wis.: Seamless Tubing, Welded Stainless Steel Tubing
Alliance, Ohio: Welded Carbon Steel Tubing
Milwaukee, Wis.: Seamless Welding Fittings

TA-5031(M)

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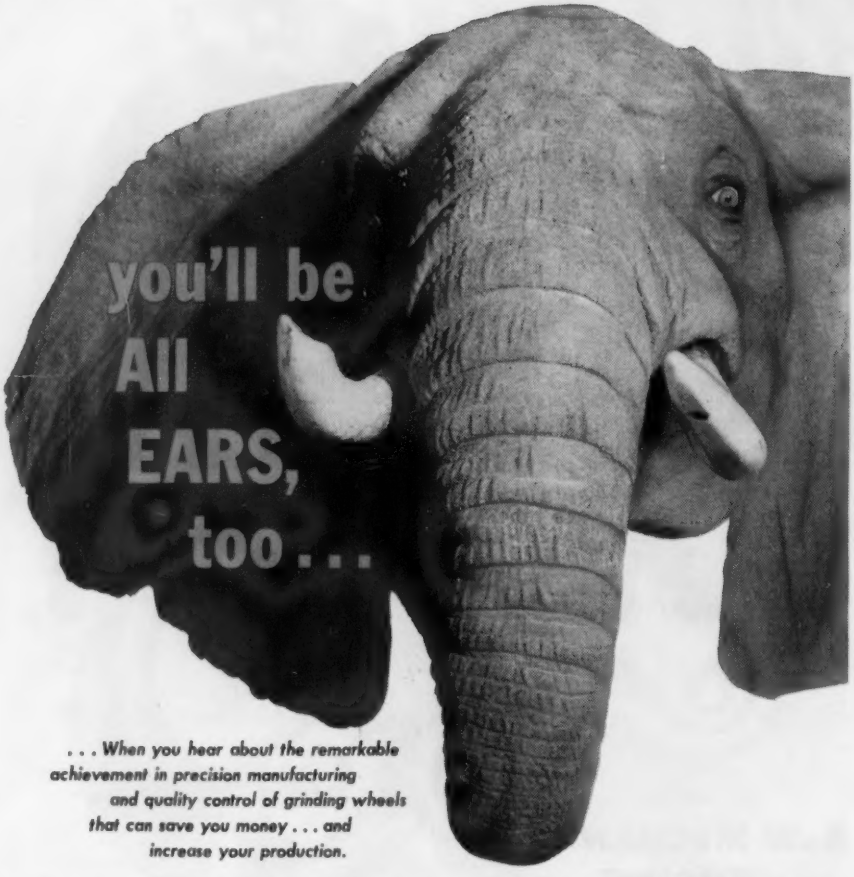

. . . When you hear about the remarkable achievement in precision manufacturing and quality control of grinding wheels that can save you money . . . and increase your production.

It's POSITIVE DUPLICATION—offered *only* by CINCINNATI (PD)° Grinding Wheels.

Through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

So, if you don't have an elephant's memory, make a pencil note to contact your CINCINNATI Grinding Wheels distributor. Or, contact us direct and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

And don't forget this—*only* CINCINNATI Grinding Wheels give you . . .

(PD) POSITIVE DUPLICATION

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

CINCINNATI® *Grinding Wheels*

°Trade Mark Reg. U.S. Pat. Off.

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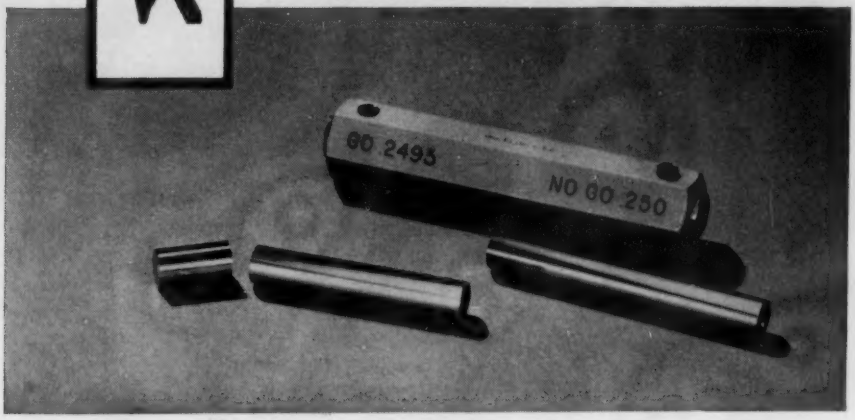
VK WIRE TYPE PLUG GAGES



VASTLY LONGER-LIVED and Money Savers . . .

because they're "Cut-off-Able" as well as "Reversible"

As a Van Keuren agent put it, "They're not only reversible, they're cut-off-able". And that means when you buy Van Keuren Wire Type Plug Gages, the sizes below 3/8" may be cut off when ends become worn and as many as from five to ten gages made available from the 1 7/8" and 2" long units. It is not only economical and practical to use Van Keuren Gages but it is a very simple operation to cut off the ends by following instructions furnished on request. The illustration above shows clearly the cut-off and reversible features.

VK Wire Type Gages are available in ZZ to XXX accuracies in sizes from .001" to 1.000". They are furnished in alloy tool steel, high speed steel, chromium plate or tungsten carbide. Whatever the gaging job, the extra length provided in VK units will save you money. It will also pay you to take advantage of VK deliveries. In many cases we can ship your requirements from stock.

VK Wire Type Plug Gages are fully described in Catalog & Handbook No. 36, available on request.

Send for a copy of the new, 258-page Van Keuren Catalog and Handbook No. 36 containing valuable technical and engineering information on measuring problems and methods. Address:

VK

37th YEAR

THE Van Keuren CO.,

175 WALTHAM STREET, WATERTOWN, MASS.

Optical Flats . . . Light Wave Equipment . . . Light Wave Micrometers . . . Gage Blocks . . . Wire Type, Taperlock and Trilock Plug Gages . . . Master Setting Disks . . . Thread Measuring Wires . . . Gear Measuring Wires . . . Carbide Plug Gages . . . Laps and Surface Plates . . . Precision Lapping Service.

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No matter how complex or unusual the work pieces...

Model 32 Dial-Master Sidney Engine or Tool Room Lathe with Sidney Fluid Tracer

the SIDNEY FLUID TRACER HEAD

instantly, precisely and uniformly transfers every change in contour from the master piece or template to the cutting tool. It also controls the hydraulically actuated cross feed and the longitudinal movement of the carriage.

Write for bulletin or ask for representative to call at your convenience.

30 OR MORE HYDRAULICALLY CONTROLLED PRE-SELECTIVE SPINDLE SPEEDS

A revolutionary innovation and presented as a "SIDNEY FIRST" as long ago as the Machine Tool Show of 1947 . . . used regularly as a standard SIDNEY feature ever since. But only recently adapted by other lathe manufacturers . . . a fitting tribute to SIDNEY pioneering and leadership.

THE SIDNEY FLUID TRACER can be furnished in connection with any size or model of SIDNEY LATHE. Small runs or quantity production runs show tremendous savings in cost per finished piece. Changeover to standard lathe operation or back to tracer control requires just a few seconds. No addition or removal of parts is necessary because the tracer motor may be turned off while the lathe does standard lathe work.

Look at what work you can turn with the SIDNEY FLUID TRACER attachment:

IT'S "SUPER" IN EVERY WAY

SUPER SWIFT...
SUPER ECONOMICAL...
SUPER SENSITIVE!

THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904

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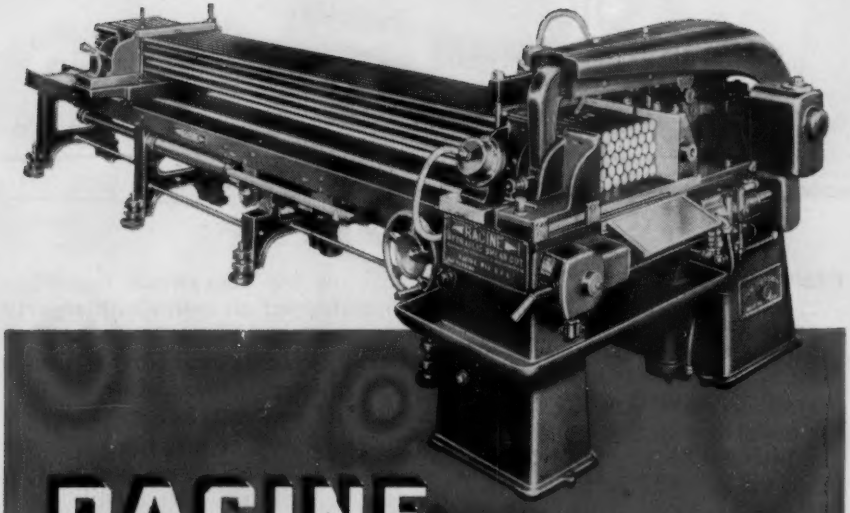

RACINE

30 SERIES AUTOMATIC STOCK FEED MACHINE

The most accurate and efficient production metal cutting machine ever offered. Fully automatic — complete hydaulic operation, with a minimum of moving parts. Simple control makes it possible for one man to operate more than one machine. Offers unusual labor and material savings.

Available in capacities of 10" x 10", 12" x 12", and 12" x 16". Stock rests in 14', 18' and 22' lengths.

Write for catalog and prices of complete RACINE line, including single purpose, special and fully automatic models. Capacities from 6" x 6" to 20" x 20".

Operating Features

1. **Completely hydraulic in stock movement, clamping and cutting.**
2. **100% progressive feed —dual type feed control.**
3. **Pivoted (open) type extra rigid construction castings are of special close-grained iron.**
4. **Hydraulic feed moves loaded carriage by controlled setting from cut to cut—operates chucks and controls cutting — all automatically.**
5. **Convenient "all front" control allows operator to control all phases of the automatic cycle from one position.**

RACINE HYDRAULICS & MACHINERY, INC.

2070 Albert St., Racine, Wisconsin

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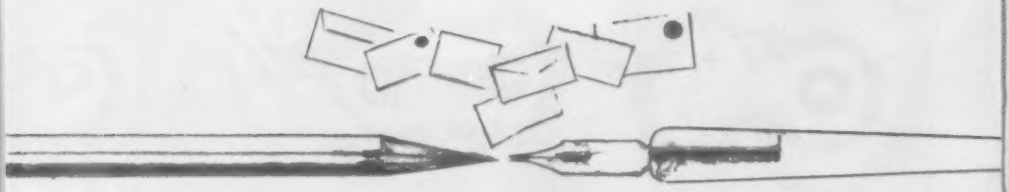
OVER THE EDITOR'S DESK . . .



KEEPING MODERN

X-ray movies have been made of the innards of an engine while it is running. Achieved by a General Electric-Detroit Arsenal engineering team, the feat involved taking X-ray pictures of internal movements of an engine through its steel housing and visually "stopping" action with the aid of a betatron. The slow motion movies of moving parts have enabled engineers to scrutinize, for the first time, complete cycles of engine operation for faulty performance or wear. Called Stroboradiography, the new technique could have a significant effect on engineering design.

* * *

The wraps have finally been taken off the "picture-phone" — the project that has been a top drawer secret at the Bell Telephone Laboratories in Murray Hill, New Jersey. According to its developers, the picture-phone permits people to see each other while they're talking on the phone; the image is said to be as clear as the average newspaper photo reproduction. The angle of possible embarassment has been taken care of. Bell Labs scientists have equipped the new phone with an anti-Peeping Tom switch, which has to be flipped on before either party involved can be visible. The new phone is not as yet in the manufacturing stage. A few details such as size and cost still have to be worked out, but don't be surprised if in the not too distant future you will be able to dail anywhere in this country and actually be face-to-face with the person you're calling.

* * *

A mechanical tree planter "zipped" trees into the ground during a recent demonstration in Cleveland at the rate of 1,000 per hour. The American Public Works Association described the device as a disk and plow connected to a tractor. An operator pokes a seedling through a slot in the machine at intervals after the disk has broken the earth. Two rubber-tired wheels in a V-shape follow the planter and close the opening, "zipping" in the seedling.

★ ★ ★

PEOPLE'S CAPITALISM

It will, no doubt, come as a shock to the communist sphere of influence, but the American capitalist is a woman. A recent report of the New

FOUND WHERE AIRCRAFT POWER AND CONTROLS TAKE SHAPE

GRAND RAPIDS GRINDERS

SUPER SABRE F-100
NORTH AMERICAN
AVIATION, INC.

Bendix
BENDIX PRODUCTS DIVISION
BENDIX AVIATION CORP.

FAIRCHILD ENGINE DIVISION
FAIRCHILD ENGINE AND AIRPLANE CORP.

FORD INSTRUMENT COMPANY
DIVISION OF SPERRY RAND CORP.

HAMILTON STANDARD DIVISION
UNITED AIRCRAFT CORP.

LEAR, INCORPORATED

ORENDA ENGINES LIMITED

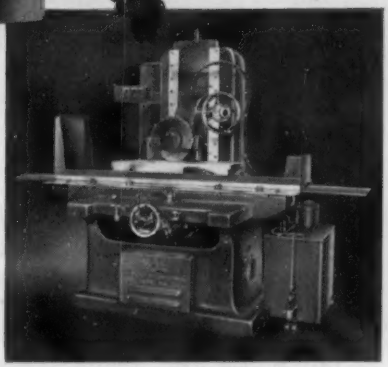
PRATT & WHITNEY AIRCRAFT
DIVISION OF UNITED AIRCRAFT CORP.

WRIGHT AERONAUTICAL DIVISION
CURTISS-WRIGHT CORP.

Precision is paramount in the manufacture of components for aircraft power and control. That's why these makers of precision parts have Grand Rapids Grinders in their toolrooms — for the utmost in precision grinding.

Model No. 55, for example, features one-piece column and base for permanent vibrationless rigidity. Longitudinal travel table and cross feed are hydraulically actuated. Wheel head has powered rapid vertical travel. And it's faster than any other grinder of this type and size . . . with variable table speed up to 125 fpm.

With these built-in precision features typical of all Grand Rapids Grinders, it's no wonder they're found in leading toolrooms.



GRAND RAPIDS NO. 55 HYDRAULIC FEED SURFACE GRINDER. Table speed up to 125 fpm. Working surface of table is 12" x 36". Vertical movement of wheel head is 18". Preloaded ball bearing spindle greased for life. Spindle speeds 1925 and 2500 rpm.

A note on your letterhead will bring full details.

GALLMEYER & LIVINGSTON

GALLMEYER & LIVINGSTON COMPANY

408 Straight Ave., S.W., Grand Rapids, Michigan

York Stock Exchange shows that women shareowners, notably housewives and non-employed women, outnumber men. The same report shows that the number of individuals holding shares of stock in publicly-held companies totaled 8,630,000, a new high and a gain of 33 per cent in the past four years.

Further, two-thirds of all shareowners have annual incomes of less than $7,500, and the greatest growth in shareownership has taken place in the communities with populations of from 2,500 to 25,000. These facts would seem to show that American capitalism has become the "people's capitalism," which is a considerable change from the type caricatured by communist cartoons.

★ ★ ★

"ELEVEN COMMANDMENTS OF GOOD BUSINESS"

A CUSTOMER . . . is the most important person in any business.
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A CUSTOMER . . . is not someone to argue or match wits with.
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A CUSTOMER . . . is deserving of the most courteous and attentive treatment we can give him.
A CUSTOMER . . . is the fellow who makes it possible to pay our salary whether we are a truck driver, plant employee, office employee or manager.
A CUSTOMER . . . is the life blood of this and every other business.

★ ★ ★

ROOFTOPS

The latest forecasts on population figures indicate that in the U. S. by 1970 will be some 204,000,000 citizens. If rates of growth are accurate, we must build from 1,300,000 to 2,400,000 new dwellings every year in order to keep enough roofs over our heads.

★ ★ ★

FRINGE BENEFITS

A survey of 1,000 companies by the Chamber of Commerce of the United States showed recently that fringe benefit costs — payments by employers for pensions, vacations, social security and the like — averaged $819.00 per employee in 1955, an increase of $99.00 since 1953. Of

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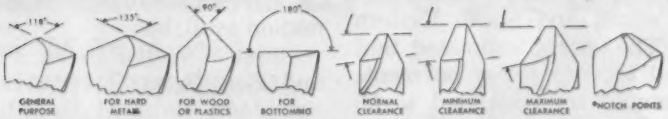

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the reporting companies, 124 had submitted data in each of five biennial surveys conducted by the Chamber since 1947. Fringe benefit payments by this identical group of companies was $981.00 per employee in 1955, or $167.00 more than in 1953.

Broken down, the survey showed that the 1955 average of $819.00 per employee included $254.00 for agreed upon programs of pensions and insurance, $254.00 for vacations and holidays, $145.00 for legally required programs of Old Age and Survivors insurance, Unemployment and Workmen's compensation and others, $89.00 for rest periods, and $77.00 for miscellaneous.

Highest payments were made by companies located in the North East, followed by the Western, East North Central and South Eastern regions. The survey estimated that the grand total in fringe payments for all employers amounted to 36 billion dollars. This compares with an estimate of 1.5 billion dollars paid by American employers for such programs in 1929.

★ ★ ★

HOW TO KILL IDEAS

The seven comments herewith were selected from a list which was put together by the New York Chapter of the American Society of Training Directors. We hope that readers of *Modern Machine Shop* are not guilty of using these phrases . . . at least, not too often.

We tried that once before.
It costs too much.
We have never done it that way.
That is not our responsibility.
We are not ready for that.
We are doing all right without it.
It won't work.

★ ★ ★

The Editor's Notebook

In order to better gather together and evaluate information relating to significant developments in the metalworking field, the editorial staff of MODERN MACHINE SHOP makes every effort to be on the spot where events are taking place. The following contacts, occurring since the last issue of the magazine went to press, is an important part of the job which is being performed to bring you the latest and best information available.

Guest of Walter Praeg, President and Ben Bregi, Executive Vice President, National Broach Company, Detroit, at press preview showing of new "Tooth Honing System." Preview afforded introduction of a new machine, a new product and a new method which you will want to read more about. See Page 208 of this issue.

Attended Chicago meeting of Society of Business Magazine Editors so that we could brush up on latest methods and techniques available for production of printed word and other subjects of mutual interest to

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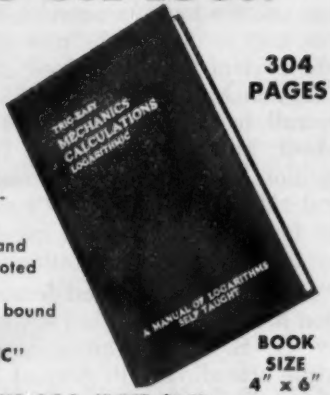

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OVER THE EDITOR'S DESK . . .

editors; i.e., makeup, contacting contributors, contacting plants for material, payment for material, and so on.

Visited International Harvester Company's "Automation Demonstration for Employees" setup at their spacious and well-equipped Research Laboratories in Chicago. This showing, involving latest thinking in automation in all of its ramifications as it relates to metalworking, was designed to stimulate and inspire greater development along these lines throughout all of far-flung I. H. Divisions. Hope to have more about this in a later issue of *Modern Machine Shop.*

At Chelsea, Michigan, proving grounds viewed first showing of Chrysler Corporation's 1957 cars. Results of the $300 million expenditure on new tools, equipment, facilities, and so on, for the new models was evidenced by such features as "Torsion-Air" suspension, 55 inch overall height of car, the 14 inch wheel, just to name a few. In our opinion, for beauty, performance, and riding quality, the 57's exceed, by far, anything offered heretofore by the Chrysler Corporation.

Witnessed display and demonstration firing of Army's latest weapons by U. S. Army Ordnance Corps while attending 38th Annual Meeting of American Ordnance Association at Aberdeen Proving Ground, Maryland. Particularly impressive were the firing tests of the new Caliber 7.62 mm. machine gun, the new anti-tank guided missile with the popular designation of "Dart," and the "Honest John" 762 millimeter rocket.

As this issue of MMS goes to press, we are getting ready to leave for the Metal Show in Cleveland where we hope to view and discuss the latest mechanical and metallurgical developments with the technical personnel who gather together once each year for this important event. Since we do not have a booth at the show this year, we hope to be able to spend more time visiting the many friends of MODERN MACHINE SHOP and her sister publication PRODUCTS FINISHING.

★ ★ ★

Letters to the Editor:

Outside Design Services

Will you please furnish us with a copy of the article "Using the Services of an Outside Design Firm" which appeared in the December, 1954 issue? Please direct the copy to the attention of the writer.

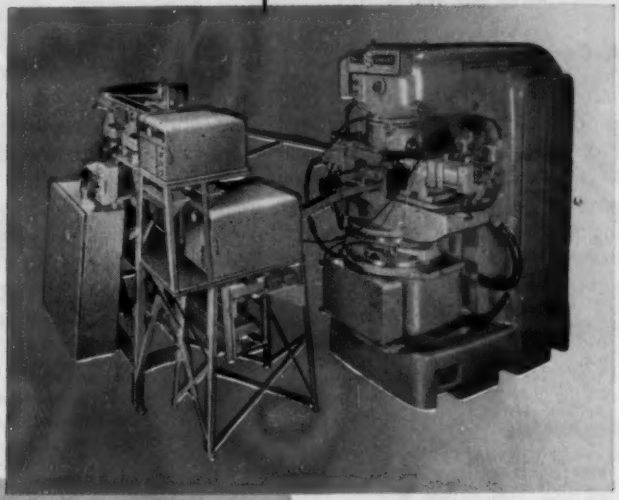
C. O. Doerter
Remington Arms Company, Inc.
Lake City Arsenal
Independence, Missouri

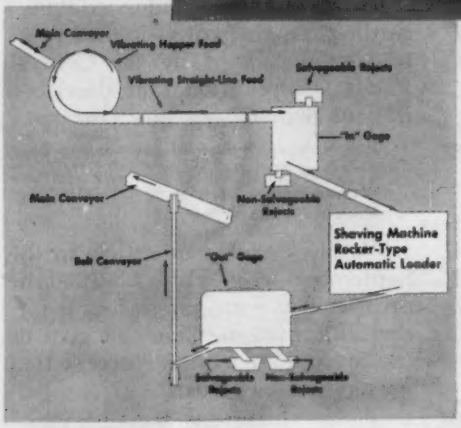
Would you please send me a reprint of the article "Using the Services of an Outside Design Firm"?

Irwin W. Oest, Professor
Industrial Management Engineering
Iowa State College
Ames, Iowa

FOR MINIMUM COSTS

SHAVE GEARS AUTOMATICALLY





This is fully automatic Red Ring gear finishing.

Cut gears come in on a conveyor to the storage and feeding mechanism. This may be a vibrating hopper, overhead chute or other device.

These gears are fed into an "In Gage" which screens out under size and greatly oversize parts, passing only those within tolerance to the Shaving Machine.

After shaving the gears then go through the "Out Gage" where they are checked for size and helix angle—again screening out the rejects.

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OVER THE EDITOR'S DESK . . .

Sine-A-Dex

I wish to thank you for sending me the address of the manufacturer of the grinding fixture known as Sine-A-Dex. I have written a letter to Star Gauge Company, Box 83-H Station, Springfield, Massachusetts, and I expect to hear from them shortly.

John Wm. Schukraft
1213 E. Belvedere Avenue
Baltimore 12, Maryland

One Best Way

We would like to obtain ten reprints of the article on page 118 of the August issue entitled "The Quest for the One Best Way."

E. J. Hammele
Caldwell Manufacturing Company
Rochester 14, New York

The August issue of *Modern Machine Shop* carried an article by W. A. Nordhoff titled "The Quest for the One Best Way." We are particularly interested in Mr. Nordhoff's fourteen rules of work, and would appreciate receiving five reprints of this article. If there is any charge made for supplying the reprints, you may send the bill marked to the attention of the undersigned.

Lloyd T. Erickson, Manager
Manufacturing Standards Department
Ford Division of Ford Motor Company
966 S. Mississippi River Blvd.
St. Paul 1, Minnesota

Automatic Drill Feeds

On page 122 of the September issue of *Modern Machine Shop* appeared the very fine article "Automatic Drill Feeds Speed Production" which was accomplished by General Pacific Corporation. In the manufacture of our push button switches, we encounter a number of drilling operations and we are, therefore, interested in the increased production which we may be able to accomplish. We are wondering, therefore, if you have any additional detailed information regarding the device which is being used to accomplish the production increase.

Howard W. Taylor, Vice President
The Capital Machine Company
36 Balmforth Avenue
Danbury, Connecticut

I would like more information regarding the air-hydraulic drill press feed as developed by the General Pacific Corporation and described in your September issue.

J. F. Pirages, Industrial Engineering Dept.
American Air Filter
Herman Nelson Division
Moline, Illinois

We have read your article in the September issue about automatic drill feed. We are interested in further information. Can you give us the name of the manufacturer so that we may contact them?

G. E. Maurer, Engineer
Infilco, Incorporated
P. O. Box 5033
Tucson, Arizona

● *Additional details can be quickly obtained by writing directly to General Pacific Corporation, 8740 Washington Boulevard, Culver City, California.—Ed.*

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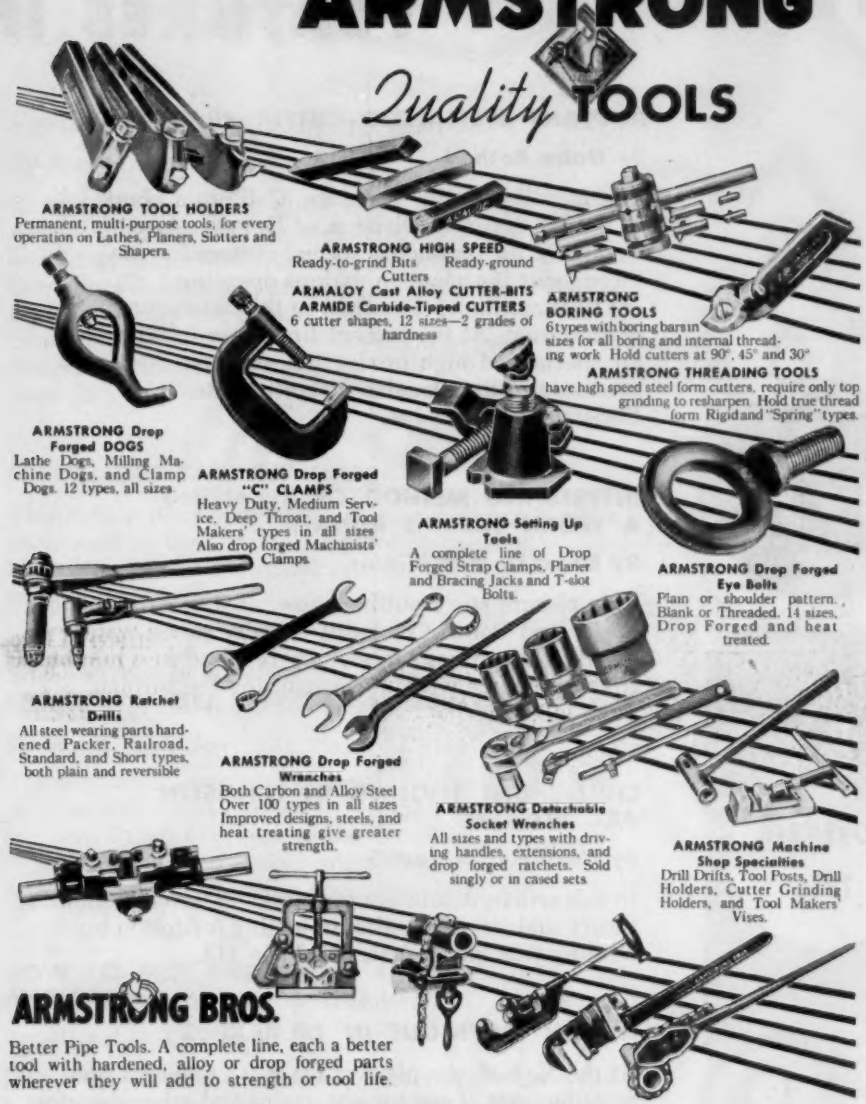

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6 cutter shapes, 12 sizes—2 grades of hardness

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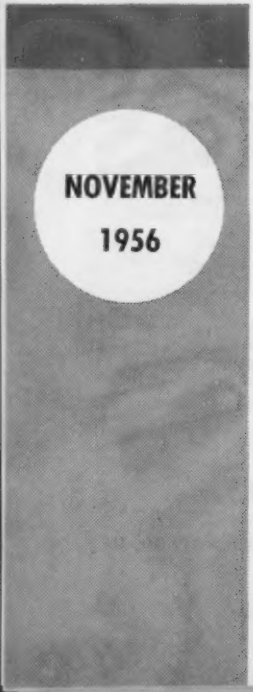
FEATURES IN



IN-PLANT SPECIALIZED CUTTER PRODUCTION

By Gabe Roth

The facilities at the Torrance, California plant of the El Segundo Division of Douglas Aircraft Company for producing special cutters for use throughout the plant in various operations are illustrated and described in this interesting presentation. At the present time, over 3,500 cutters for specialized high production use have been produced in the Douglas Aircraft Cutter Department. Page 104.

INTERESTING METHOD OF REPAIRING A WORN TURBINE RUNNER

By Lloyd D. McWilliams

This picture story outlines how, at The Shawinigan Water and Power Company, a badly pitted water turbine runner was successfully repaired in a minimum amount of time without dismantling the turbine. Page 110.

CHILL-SHUNT TOOLING IN TUNGSTEN ARC WELDING

By Harlan L. Meredith

In this article, details are presented on the chill-shunting theory and its application in tooling for fusion butt welding thin gauge material. Page 114.

A NEW TECHNIQUE IN DIEMAKING

At the New Haven plant of the A. C. Gilbert Company, manufacturer of erector sets, trains and other electrical items and metal toys, a specially equipped die handling unit reduces time and increases efficiency in die manufacture. Page 118.

THIS ISSUE

VOL. 29
No. 6

KEYING BY THE WOODRUFF METHOD

By Fred Rogers

In this concluding installment of a two-part article, the author covers the early development of Woodruff keys, their standardization by the American Standards Association and various types of keyway cutters and chucks and their use. Numerous lined sketches of keys and keyway cutters are used to illustrate the text. Page 120.

ASSEMBLING TAILPIPE SUPPORTS

This article illustrates and discusses a compact press setup used at the Oldsmobile plant in Lansing, Michigan, to assemble dual exhaust tailpipe supports. Page 130.

SAFE MOUNTING METHOD FOR SMALL DIAMETER PIERCING PUNCHES

By W. M. Halliday

The discussion covers an unusual, yet simple, method of mounting small diameter piercing punches which has been found to eliminate the danger of bending or fracturing such punches when they inadvertently become overloaded during operation. Page 132.

HOW TO MEET SHORTAGES OF ENGINEERS AND HIGHLY SKILLED WORKMEN

By Alfred M. Cooper

In this very timely article, the author draws upon his many years of experience in presenting a number of remedies for meeting shortages of engineers and highly skilled workmen in industry. Page 140.

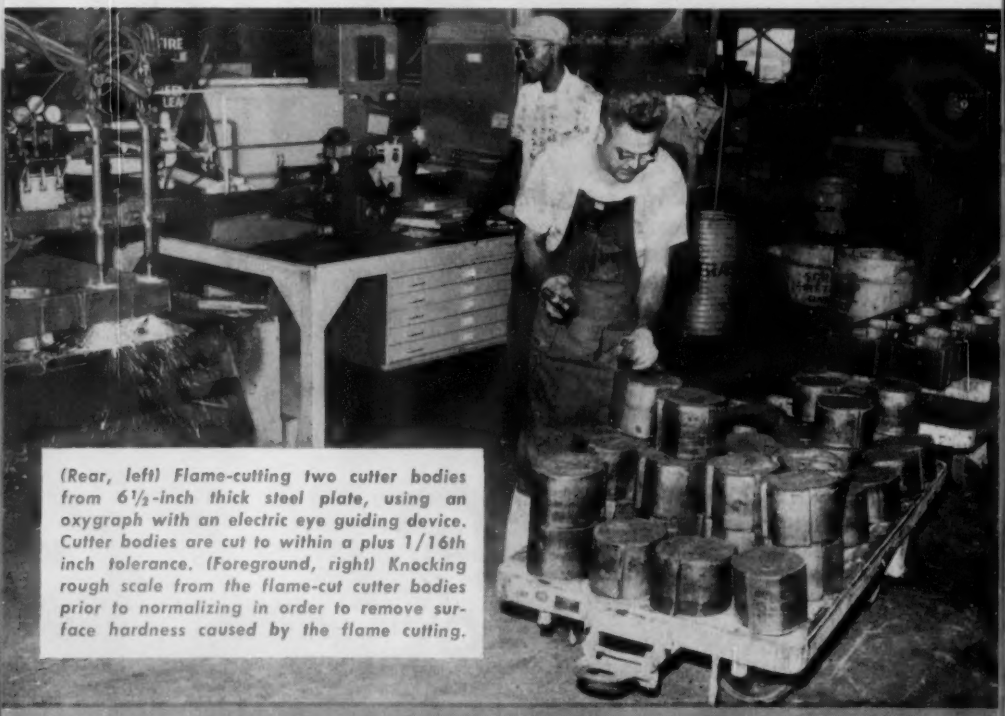
In-Plant Specialized

Douglas Aircraft cutter department has produced over 3,500 cutters for specialized, high production use.

By GABE ROTH

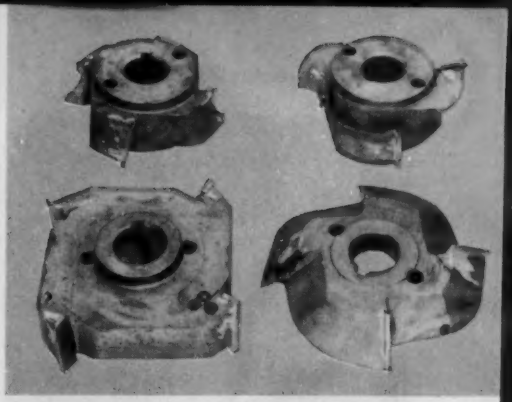
Assistant Foreman, Tool and Cutter Grinding,
Torrance, California Plant,
El Segundo Division of Douglas Aircraft Company

Soon after the huge (308-foot long) Farnham Long Mill was installed at the Torrance, California plant of the El Segundo Division of Douglas Aircraft Company, trouble was experienced in getting cutters for it in sufficient number, at the right time, and of suitable quality to keep the big mill in constant, optimum operating condition. To combat this situation, Douglas engineers decided to start a cutter making department of their own. Accordingly, professional tooling engineers from the Tool Department, carbide specialists from the Plant Engineering



(Rear, left) Flame-cutting two cutter bodies from 6½-inch thick steel plate, using an oxygraph with an electric eye guiding device. Cutter bodies are cut to within a plus 1/16th inch tolerance. (Foreground, right) Knocking rough scale from the flame-cut cutter bodies prior to normalizing in order to remove surface hardness caused by the flame cutting.

Cutter Production



Typical special cutters made in the Douglas cutter department. More than 3,500 special cutters have been turned out to date.

Department, and experts from Perishable Tool Maintenance got together and formulated the necessary plans.

Starting with only a limited knowledge of the special techniques entailed in cutter production, it was decided first to arrive at a basic design, as a precaution against possible variations in cutter operating characteristics. After a study had been made of possible cutter requirements, a series of basic types of cutter bodies was determined, and from these, a small cutter was made to establish the essential features. After a series of machining tests confirmed the soundness of this basic design, an 8-inch diameter sparboom cutter was produced and mounted opposite a similar commercially produced cutter on the Farnham Mill where it would encounter duplicate operating conditions.

The company-built cutter proved more than satisfactory. It required a minimum of 10 per cent less horsepower than its commercially produced counterpart, and produced a superior surface finish.

This trial run was conducted two years ago. Since that date, the new Douglas cutter department has produced over 3,500 cutters for specialized, high production use. The cutters range through two-bladed, four-bladed, open and closed helix angle combinations, staggered tooth, forward and reverse direction of rotation, two-part and three-part assemblies, special end mills, shell mills, and insert-blade cutters for a variety of materials. These cutter types can now be produced on short notice without the usual delay in obtaining them from an outside source.

In all but a few minor exceptions, helical tooth forms are used on all cutters produced. Although more expensive to manufacture, it has been found that the helical design produces a better surface finish and that the initial cost factor is more than offset by eliminating most of the usual deburring after machining.

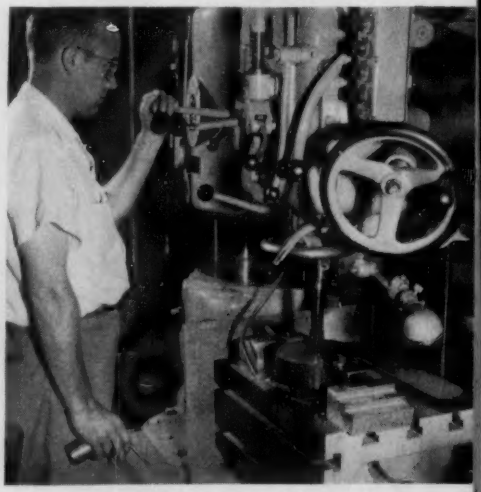
The facilities and techniques used in producing the cutters will be of interest to any shop man faced with the problem of obtaining specialized cutters in large quantities. The first operation in cutter production is to flame-cut the body from 1020 steel with an oxygraph. The oxygraph is equipped with a photoelectric cell tracing head which follows a paper cutout pattern of the cutter body. The bodies are cut from sheet steel up to 6½ inches thick and

Close-up view of the electronic tracer and pattern used in cutting the cutter bodies. The electric eye follows the periphery of the paper cut-out pattern. This particular oxygraph-guiding device can readily maintain a tolerance to within plus 1/16th inch.

to within a plus 1/16th inch of finished size. Multiple cutting heads on the oxygraph make it possible to flame-cut several cutter bodies in a single operation. Immediately following flame-cutting, the cutter bodies are cleaned and scaled and then given a normalizing heat treatment to eliminate the surface hardness caused by flame cutting and prepare them for the following machining operations. An outstanding characteristic of this operation is that cutter bodies may be flame-cut from 6½-inch thick steel plate in a matter of minutes with less than ¼-inch waste of material along the flame track.

After normalizing, the blanks are set up in a special fixture on a radial drill and drilled through for arbor and attachment bolts. These holes follow a conventional pattern common on all bodies of one size. The bodies are then formed to proper width and diameter on lathes and then go to the mill line where, using special holding fixtures that index for producing the necessary offsets for tooth mounting, the blanks are completely machined. After milling, the corners are blended and the parts are deburred preparatory to brazing on the carbide blades.

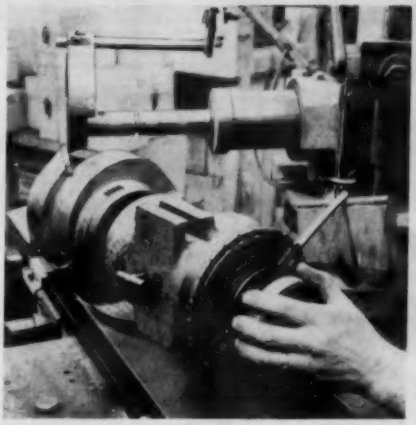
Blade brazing is accomplished in an induction heater. The cutter body is first brought to a cherry-red temperature in the area on which the blade will be brazed. A special silver solder material is used for brazing. This material sandwiches a thin nickel alloy sheet between two exterior sheets of silver solder. In brazing, the exterior silver solder sheets adhere to the cutter blank and



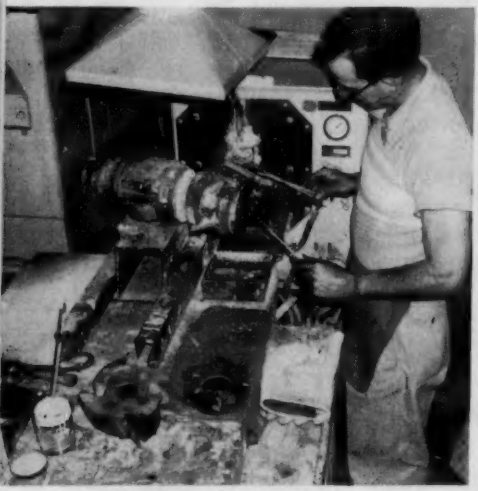
Cutter body set up in a radial drill for drilling arbor hole. Using the precision-drilled arbor as a mount, the body is then set up in an indexing milling machine for the purpose of milling the periphery shape, and then in a lathe for final shaping of the cutter body.

carbide tablet respectively, while at the same time the sandwiched nickel alloy sheet adheres to the silver solder sheets. The purpose of the interleafed nickel alloy is to act as a shock absorber during cutter operation. Shocks that might otherwise shatter the carbide blade are partially absorbed by this material, reducing the danger of breakage.

After the carbide blades are brazed in place, the rough cutters are mounted for grinding. The helical grind is accomplished on a specialized Douglas-designed and built fixture. As might be expected, the initial grinding operation along the helical form using a diamond-impregnated wheel is a lengthy process when grinding the helical rake angle. However, it is considered that this initial tool grinding time is more than offset by a reduction in finishing time required after machining production parts.



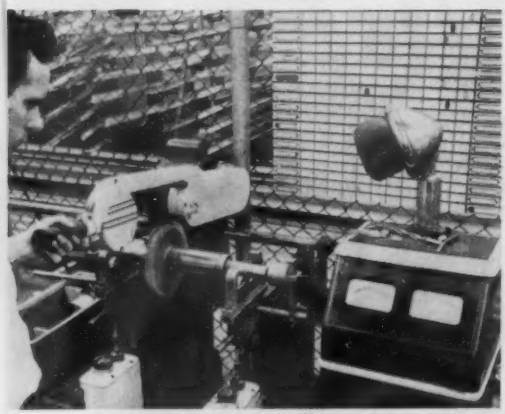
Grinding a helix cutter blade on a Douglas-designed cutter grinder. Note dowel rod in indexing ring which follows dowel rod welded to cam plate as the cutter is traversed past the grinding wheel. This particular arrangement provides a true helical shape.



Brazing carbide tablets on a rough cutter body in an induction heater. Silver solder interleafed with a nickel alloy is used for this operation. The nickel alloy sandwiched between the silver solder sheets acts as a "shock absorber" during use of the cutter.

When the helical-grinding operation was first performed using the conventional type of cutter grinding equipment, it was found difficult to obtain the degree of accuracy in tooth spacing that is necessary for the high rotational speeds of the cutters in operation. This is where the Douglas-designed grinding fixture entered the picture.

This fixture is comprised of a simple work head for holding a cutter with provisions for swiveling in the verticle plane. An indexing ring with four radially disposed jig-bored holes ninety degrees apart (corresponding to tooth-spacing) is attached to the operative end of the spindle. The helical form is generat-



Balancing a finished cutter on an electronic balancing machine. Cutters are balanced both statically and dynamically. The "strobe" light shows where metal must be removed to provide the necessary balance. This operation is readily accomplished by shallow drilling.

ed by inserting a length of dowel rod in one of the radial disposed holes and allowing it to follow the upper surface of an inclined cam plate as the table and work head are traversed past the grinding wheel. The cam has a length of similar diameter dowel rod welded to its upper surface, and the plate is attached to a rigid bar extension mounted on the wheel head of the cutter grinder, remaining in the same position throughout the operation.

As the machine table is traversed toward and away from the grinding wheel, the dowel rod slides along the cam plate and causes the work head to move through an arc, thus generating the required helical form. After each pass, the dowel rod is inserted into the next appropriate jig-bored hole in the index ring for grinding the next tooth to the same radial form, as in normal cutter grinding practice. The cam bar is arranged so that if for any reason the operator, while he is assisting the rotation of the cutter by steadying the movement of the index ring by hand, causes the rod to be lifted away from the cam plate, the tooth being ground is rotated out of contact with the grinding wheel. The dowel rod that is welded to the cam plate provides a simple means of producing an accurate circular form through the wide arc of contact that is necessary as the two rods trace out a helical path as the table is traversed. The welded cam guide assembly is attached to a pivot mounting block for fine setting at the end of the vertically adjustable outrigger arm extension fitted to the top of the grinding head.

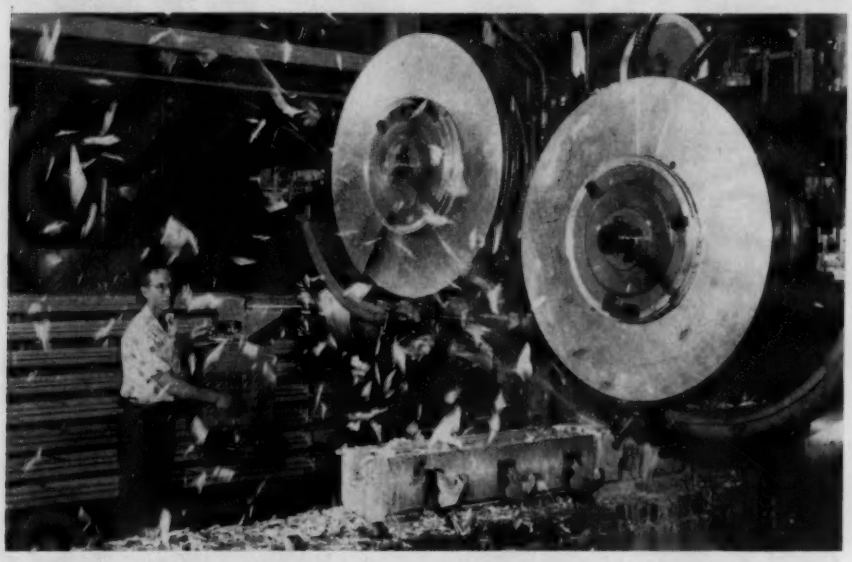
After grinding, the cutters are electronically balanced, both statically and dynamically. This is a critical operation as it has been found that good cutter balance is an important factor in cutter life and in the quality of surface finish obtained. After the cutter is balanced, it is placed in its own wooden storage box which is properly identified and goes to a storage rack marked to receive it. All standard cutters are produced in triplicate—one for the mill, one in the grinding room, and one in reserve.

Some deviations are made from this standard cutter production procedure when and if necessary. For instance, when a cutter will be used for a considerable period, or when it will be subjected to unusually heavy production loads, the arbor hole is bored slightly oversize and then hard chrome plated to

the proper size. Production of a prototype cutter may involve deviations from the usual production procedure, but as a rule these deviations can usually be blended with the normal production pattern once the design is established.

A sidelight in this cutter production department is the technique employed to salvage the diamond dust from the numerous diamond-impregnated grinding wheels used to grind the carbide cutter blades. A small, rectangular pan is placed directly beneath each grinding wheel to catch the chips as they tear loose from their resin binder. The chips fall into a coolant solution in the pan, along with grinding wheel resin and other forms of dirt. The solids are retrieved from the coolant solution by straining it through a flannel bag. These solids are then sent to a large grinding wheel manufacturer who performs the remainder of the reclaimation work. In a two-months' period, 738 carats of industrial diamonds worth $1,254.60 were salvaged in this manner. Cost of the salvage work totaled $39.15.

About 75 per cent of the cutters now being produced are used in machining the light alloys. The other 25 per cent are used in machining aircraft-quality steels. When all cost factors are considered, including down-time costs caused by delays in commercial cutter delivery, the Douglas Company is now producing its own specialized cutters at a substantial saving. But more important, the quality of the work being turned out by the Douglas-built milling cutters is said to be superior.



It might be a "chicken picker" in action! In reality it's a pair of Douglas-built cutters mounted in a Farnham Long Mill being used for the purpose of milling an airplane spar.

INTERESTING METHOD OF Repairing a

A picture story outlining how a badly pitted water turbine runner was successfully repaired without dismantling the turbine.

By LLOYD D. McWILLIAMS
Maintenance Supervisor, The Shawinigan Water and Power Company

Generally, when a water turbine runner develops cavitation and pitting, it is necessary to dismantle the turbine completely and remove the runner from the shaft to make repairs. This is an expensive undertaking, resulting in high labor costs, plus loss in revenue due to longer down time.

This article with its accompany-

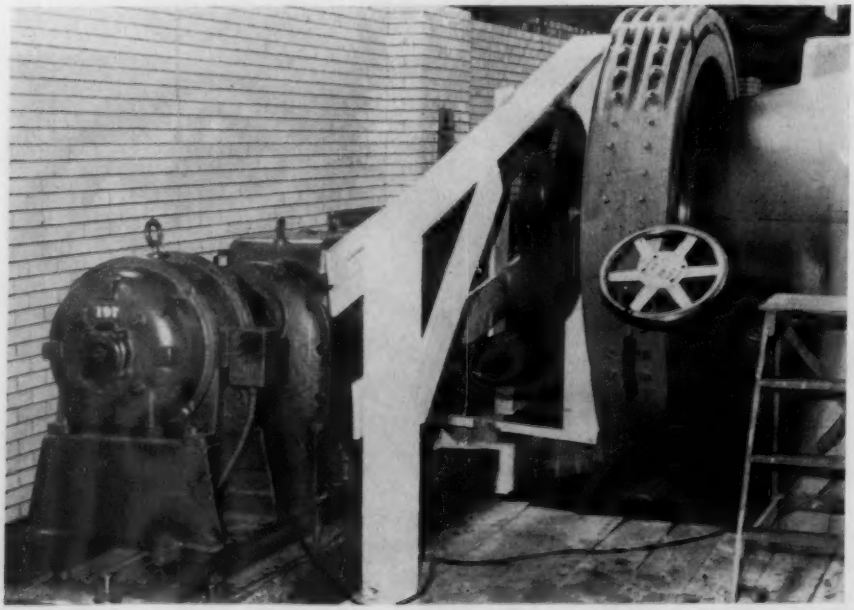


Fig. 1—View showing equipment used to turn worn runner at 1½ r.p.m. for machining.

Worn Turbine Runner

ing illustrations outlines how a runner on an old 20,000 h.p. horizontal twin turbine, which had a badly pitted ring section on the runner, was successfully repaired without dismantling the turbine or removing the runner from the shaft. Inspection revealed that the runner ring, which has a very small clearance from the seal ring, was pitted to a degree where repairs were necessary. Wear at this location makes for increased water losses and, if allowed to continue, would eventually weaken the runner.

After some discussion, it was decided to machine off the pitted area and then weld on a prefabricated stainless steel band. This band, in turn, would be machined. (Stainless steel was the only material found to effectively withstand the action of cavitation.) It was also decided to try and do the job in place; that is, remove only the draft chamber covers and the head covers. The prob-

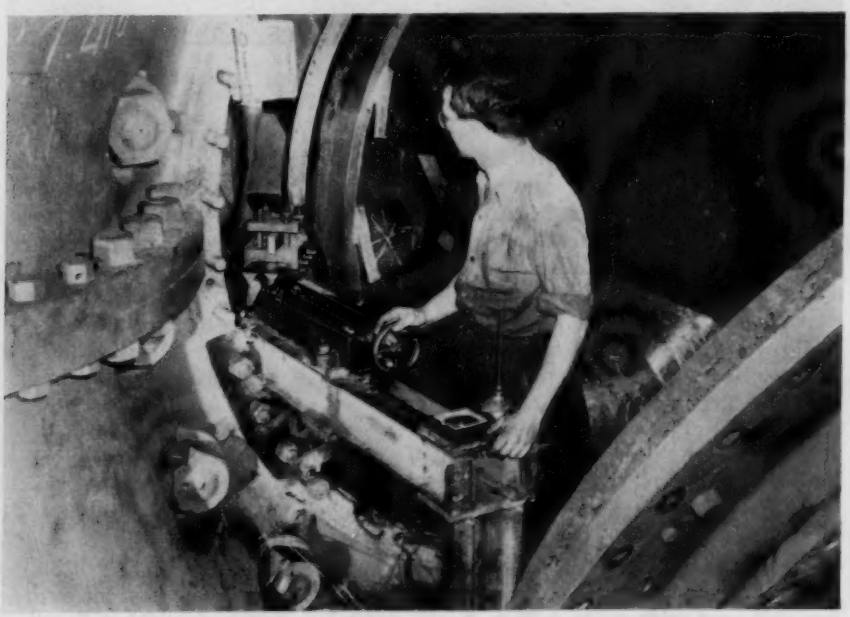


Fig. 2—Setup used to turn down pitted ring and machine stainless band when in place.

". . . no difficulty was found in turning this load with a 7½ h.p. motor."

Fig. 3—Illustration showing 1 x 8-inch stainless steel band ready for boring mill.

lem was to turn the runner at a low speed so that it could be machined. Recalling that we had, some years ago, turned and machined the shaft in order to make repairs at the gland locations, the same means of propulsion was agreed upon (*Modern Machine Shop*, October, 1953).

Figure 1 shows the method by which the runner was turned. A speed reducer with a 90:1 reduction from another piece of equipment was installed; then, by suitable sprockets and a chain drive, a speed of approximately 1½ r.p.m. was obtained. Although the combined weight of shaft and runners is nearly 50 tons, no difficulty was found in turning this load with a 7½ h.p. motor.

First, the pitted areas of the runner ring were machined to fairly close accuracy to take the stainless band which was previously machined on its inside diameter on a boring mill. The setup for machining the runner band is shown in Fig. 2. It included a temporary frame consisting of nothing more than scrap steel members tack welded to the turbine casing. A steady rest which we use for turning down commutators was installed on the frame.

Figure 3 shows the stainless steel band rolled to the proper diameter (about 7 feet). This piece of steel was 1-inch thick by 8-inches wide and, since a 21-foot length of stainless could not be obtained, three short lengths were welded together and then rolled. Only a 5-inch width

"A conservative opinion would put the time saved . . . at one month."

was required for the actual band, the extra width being allowed for machining operations on the boring mill. What appears to be spokes are really stiffeners. The machining was done by an outside shop.

Before installing the band on the runner it was, of course, necessary to cut the band in two before fitting it into place on the runner. It was then tightly clamped to the runner and tack welded. The final welding was next done on both sides of the band, two passes being made. On the inner side, the welder worked from inside the scroll case of the turbine, and here again the driving mechanism proved its worth in that all welding could be done in a "down" position by merely inching the runner around as required.

Figure 4 is a "before" view, showing the condition of the runner prior to repairs. Since it was impossible to take pictures with the head cover in place, this illustration does not portray the real seriousness of the wear caused by cavitation.

Figure 5 shows the finished job. A conservative opinion would put the time saved by doing the job in this particular manner at one month.

Fig. 4—View showing eroded and pitted condition of runner band prior to repairs.

Fig. 5—View of repaired runner looking directly into scroll case. Head cover is off.

Chill-Shunt Tooling in Tungsten Arc Welding

Details are presented on the chill-shunting theory and its application in tooling for fusion butt welding thin gauge material.

By HARLAN L. MEREDITH

Vice-President and Welding Engineer,
Airline Welding and Engineering Co.,
Hawthorne, California

During the past year, several articles have appeared extolling the advantages of using fusion butt welds in the fabrication of thin gauge sheet metal structures. Yet none of these articles have described in detail the "chill-shunting theory" and its application in the tooling that makes fusion butt welding of thin gauge material possible. Without tooling incorporating this chill-shunting principle, fusion butt welds in very thin gauges, and in foils ranging downward to 0.005 inch thick, would be almost impossible.

For several years the engineering staff at Airline Welding and Engineering Company, Hawthorne, California, has been engaged in the design of weld tooling incorporating

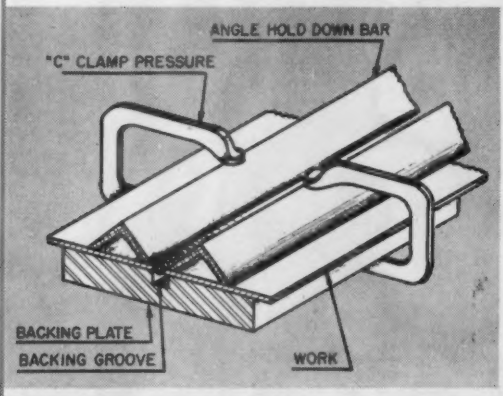


Fig. 1—Sketch of tooling for butt joints.

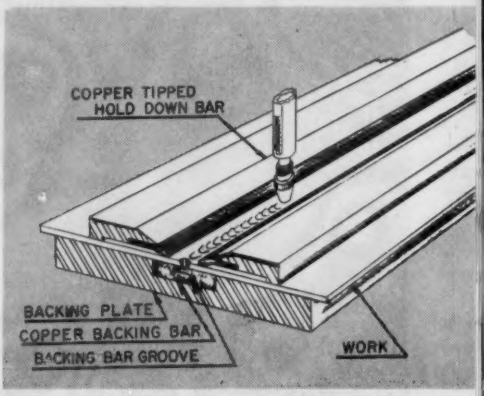
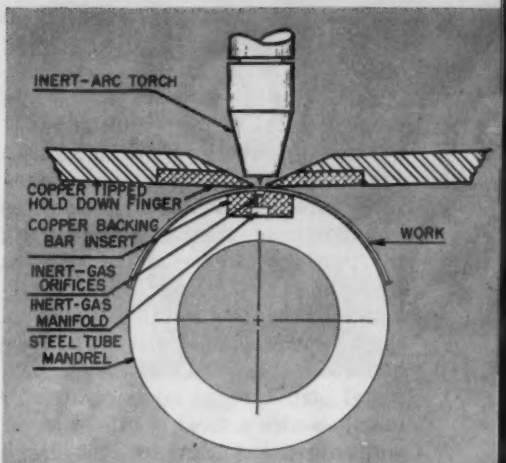


Fig. 2—Chill-shunt tooling for butt joints.

this chill-shunting principle. Most of the machines built were intended for use in the production of butt welded, thin gauge titanium, aluminum, or stainless steel components for military airplanes, missiles, or rockets. In this capacity, the company had to produce consistently good butt welds that would meet all stringent military specifications, and do it in a manner so that they could be "classified" to produce a certain type of weld repeatedly at specific machine settings. The detail data in this article is based on the accrual of experience gained during design and fabrication of these machines.

The chill-shunting theory is based on the fact that the main difference between butt welding ½-inch thick plate and 0.010-inch thick foil is one of mass. When welding ½-inch thick plate, there is plenty of parent metal on either side of the weld to absorb and dissipate the heat without causing serious physical or metallurgical changes to occur. This ability to absorb and dissipate heat diminishes in proportion to material thickness. In very thin gauges, and in the foils, the heat generated by merely striking an arc may cause a blow-out or burn-back as heat dissipation by the parent metal is low.

In chill-shunt tooling, additional metal mass is applied under pressure to the parent metal mass in a manner to increase heat dissipation. Figure 1 is a sketch illustrating the age-old use of "C" clamps, hold down bars and backing plate. A set-up like this does increase heat dissipation as well as serve as a jig or holding fixture, and is a rudimentary example of the chill-shunting theory.



BACKING BAR GROOVE AND HOLD DOWN SPACING DIMENSIONS FOR AUTOMATIC INERT-ARC WELDING

MAT'L THICKNESS		.005-.010	.010-.015	.015-.020	.025
GROOVE	WIDTH	.040	.060	.080	.100
	DEPTH	.015	.020	.025	.030
HOLD DOWN SPACE		3/64	1/16	3/32	5/32

Fig. 3—Automatic chill-shunt tooling.

Figure 2 illustrates the use of the chill-shunting theory as it was conceived in the beginning. Figure 3 is a refined version of chill-shunting as employed on modern automatic butt welding machines. The use of this type of tooling permits ease of arc striking on very thin material, reduces the heat affected area, minimizes weld shrinkage, and eliminates distortion (oil canning) of the adjacent base metal.

Note that a copper backing bar and copper-tipped hold down bars are used. The use of copper as the contact material plays a very important role in this type of tooling. It has the best ability of any metal to conduct heat away from the weld area, and has a relatively high melt-

ing point of 1,981 degrees F. Pure silver is next best, with a melting point of 1,761 degrees F., and aluminum third best with a melting point of 1,217 degrees Fahrenheit.

The softness of copper is also an advantage in that during ordinary shop production welding, there is less danger of scratching or marring the parent weld metal components while they are being jigged or released from the welding machine. Such scratches or mars must be avoided in a critical thin gauge sheet metal structure as each scratch or mar becomes a focal point for stress concentrations. Finally, the high heat conductivity of the copper reduces the heat affected zone on either side of the weld, and reduces distortion accordingly.

Neither mild steel nor stainless steel should be used for backing bar material, or for tipping the hold down bars. These materials have relatively low heat conductivity, increase the area of the heat affected zone, and increase distortion accordingly. While these disadvantages can be offset to some extent by increasing hold down pressure and narrowing the hold down gap, this increases the danger of welding the base metal to the hold down finger tip. In a machine employing copper-tipped hold down bars, this very seldom occurs.

Only four types of weld joints have proved successful and economical in welding very thin gauge metals and paper-thin foils. These are (1) the square butt joint; (2) the edge joint (soon to be classified as a "double flare joint" by the American Welding Society; (3) the corner joint; and (4) the lap joint. The production welding machine incorporating the chill-shunting principle

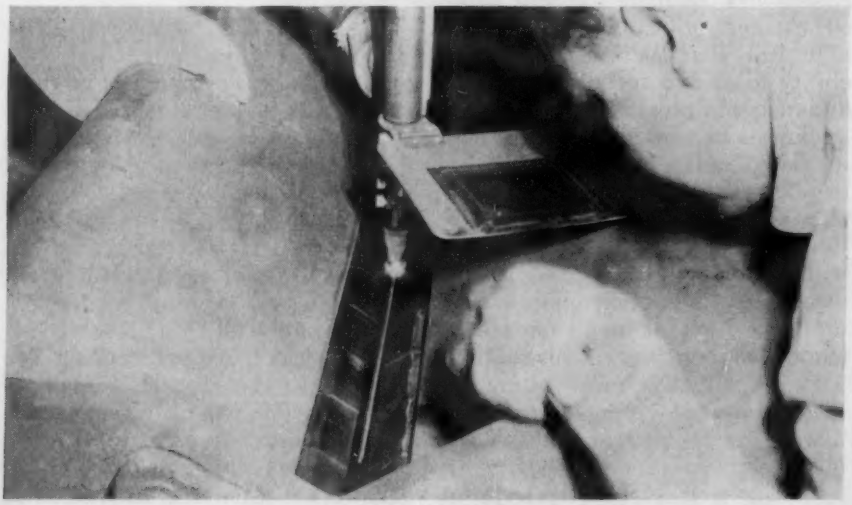


Fig. 4—Welding a 6-foot long square butt joint in 0.010-inch thick 17-7 PH corrosion resistant steel foil. An Airline Model 1009 cantilevered longitudinal welder is used.

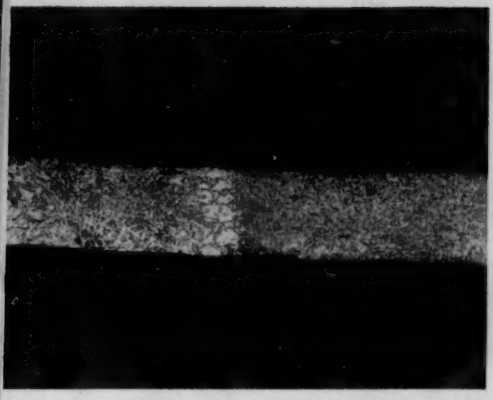


Fig. 5—Photomicrograph of an inert-arc weld in 17-7 PH, 0.010-inch thick stainless steel foil. No filler wire was used; the square butt joint was merely fused together.

Fig. 6—Photomicrograph of inert-arc weld in 17-7 PH, 0.010-inch thick stainless steel foil. Weld joint as bent nearly flat without failure or microcracks at crest of bend.

shown in Fig. 4 will handle these four joint types. T-joints in thin gauge metals are not recommended.

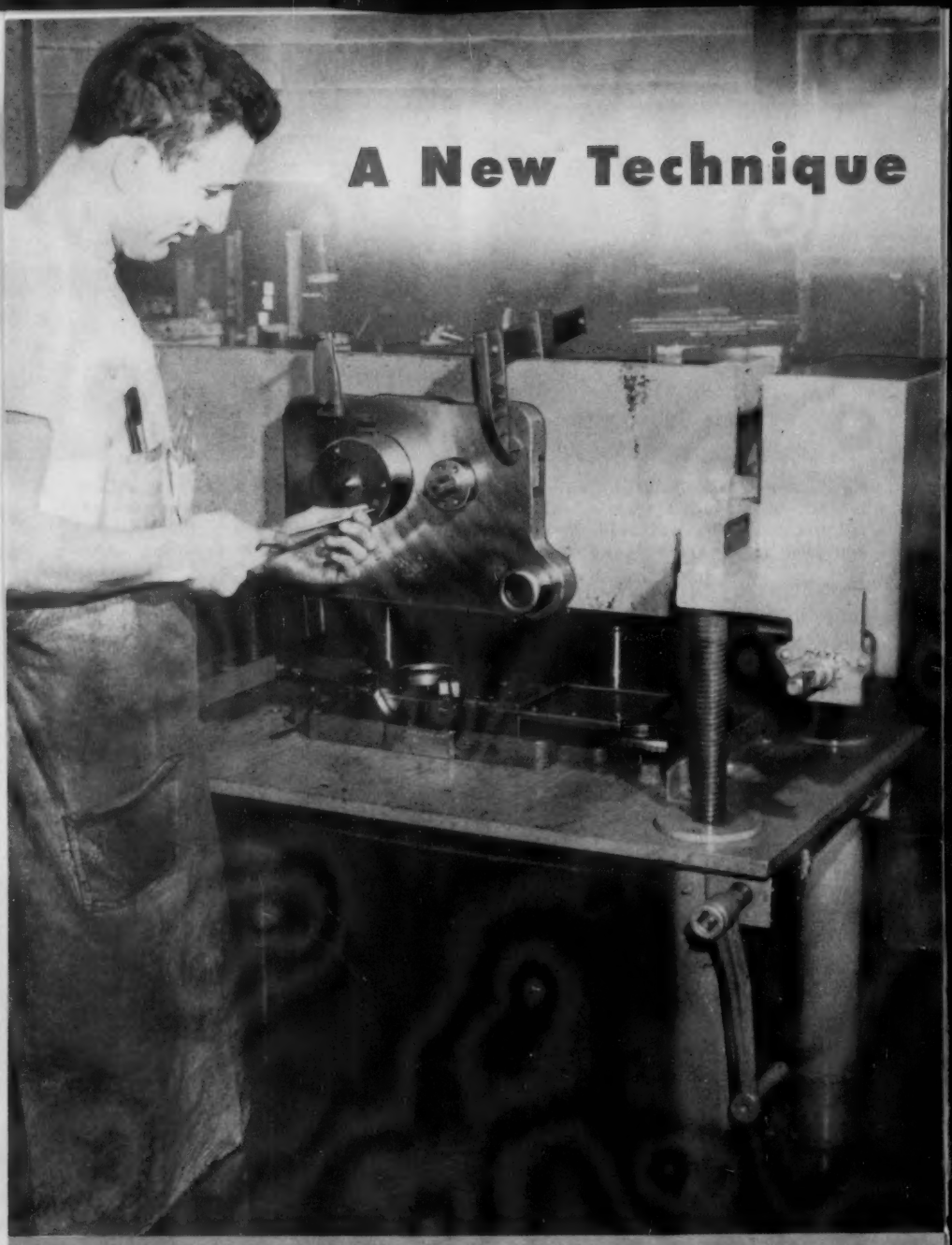
In all cases while welding very thin materials, the shielded arc welding methods should be employed. Note also in the refined version of chill-shunt tooling shown in Fig. 3 that inert gas contacts the underside of the weld. This gas is admitted into the backing bar groove through orifices from a gas manifold in the backing bar. This prevents the underside of the weld from oxidizing during actual welding.

It has been noted that with properly designed chill-shunting tooling, excessively high amperages can be used. This makes it much easier to strike the arc, either by the touch-and-go method, or the use of superimposed high frequency. While some d.c. rectifier welders can strike an arc at 15 amperes, to do so means keeping electrodes excessively clean.

In the case of the four weld joints mentioned above, the use of a filler wire is not necessary on thin material. The depth of the backing groove in the backing bar may be arbitrarily selected. On materials 0.015-inch thick or less, a groove depth of 0.020 inch has been found adequate. But a groove depth of some sort should always be used as it is practically impossible to keep the backing bar perfectly clean at all times during production welding.

The photomicrograph in Fig. 5 illustrates a butt weld in 17-7 PH stainless steel performed on a chill-shunting welding machine. Note that the weld is the same thickness as the base metal, and that the width of the heat affected zone is much less than the thickness of the base metal.

Figure 6 illustrates parent metal ductility adjacent to the weld. The bend radius in this instance is considerably less than 1T, yet no microcracks or other evidence of failure has occurred at the crest of the bend.



View of "Die-Part" Portelvator showing lifting and rotating features. Operator is filing punch.

In Diemaking . . .

Specially equipped die handling unit reduces time and increases efficiency in die manufacture at The A. C. Gilbert Company.

A new technique in diemaking at the New Haven plant of The A. C. Gilbert Company, manufacturer of American Flyer trains, erector sets and other electrical items and metal toys, which brings into use a Hamilton "Die-Part" Portelvator for die holding, fitting and separating during the critical die finishing operation has resulted in major savings of time and significant increase in efficiency.

Prior to the purchase of the "Die-Part" Portelvator, The A. C. Gilbert Company used a hydraulic press to "pull a pattern" from which to check the fit of punch and die. This was a time-consuming job which included positioning of the punch and die in the press, careful stamping of the pattern, removal of the punch and die and painstaking separation with pry bars. The punch was then carried to a workbench, filed as required and returned to the hydraulic press for another pattern, to be followed by another, and yet another, until the punch and die set passed its final critical inspection. During much of this work, two men were required and the hydraulic press was "down" for production work.

The "Die-Part" Portelvator, which is now used for this work, is of standard construction except for the top plate which is designed especially for the work and features an integral tilting mechanism as shown in the accompanying illustration. In use, the die is bolted to the Portelvator middle plate and the punch is positioned on the shank. The punch is then clamped to the Portelvator top plate (at zero position) and, with hand crank pressure, a pattern is taken. The punch and die are then separated by means of the same hand crank mechanism.

Next, transferring the hand crank to the upper position, the special top plate is rotated to a position convenient for work and the necessary filing done. Subsequent patterns are made without any repositioning of the die and punch. In this way, The A. C. Gilbert Company has reduced a difficult two-man job to a convenient one-man job, has freed a hydraulic press for production work, and has saved time and greatly increased efficiency in the making of dies.

Keying by the Woodruff Method

In conclusion, the author covers the early development of Woodruff keys, their standardization by A.S.A., and various types of keyway cutters and chucks and their use.

By FRED ROGERS

The first Woodruff keys were semi-circular in shape. In 1927, however, the Whitney Mfg. Company announced that the shape of the keys was further improved by making a small flat on the circular portion, thus giving two short rounded edges on the underside for convenience in starting the key into the seat. The height of this flat is approximately 0.010 inch.

The American Standards Association pamphlet B 17-1930 issued in December 1930 states that both round and flat bottom types are optional designs and so lists them. It

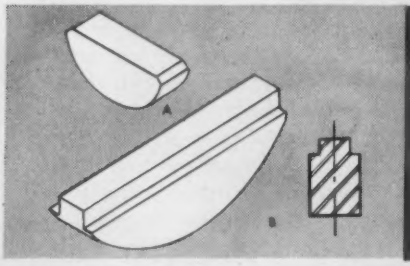


Fig. 17—(A) Key having ends with 1/32-inch x 45-degree bevel. (B) Key narrow in width at top to take mating pieces of equal bore and shaft size without rebroaching keyway.

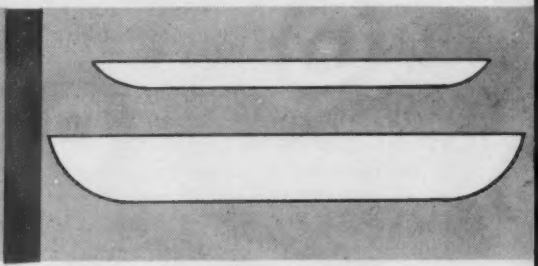


Fig. 18—Sketch showing special forms of Woodruff keys made of rectangular stock with rounded ends so as to readily conform to the radius of a regular Woodruff key cutter.

also states that all sharp corners shall be removed from all finished keys. A 0.010-inch radius of these corners or edges is optional so long as they are not sharp. Sharp edges would tend to shear away metal in the key seat and thereby cause an improper fit between the key and shaft.

Ordinarily the keyway in the mating piece is broached to a depth of half the width of a key plus 1/64 inch. This would allow a 1/64-inch clearance over the top of the key. However, some keys have been observed of the design shown at (A) in Fig. 17. The ends of the key are chamfered to obtain a 1/32-inch by 45-deg. bevel. The thought behind this chamfering operation is that if the top of the key is not assembled parallel to the axis of the shaft, the rocking of the key in the keyway would not be hindered by a sharp key end digging into the keyway during the assembly operation.

The key shown at (B) in Fig. 17 was made narrow in width at the top side to accommodate mating pieces of equal bore and shaft size without rebroaching the keyway. In this instance, previously made change gears, which were used elsewhere, were made available for another installation. Standardization of gears was thereby effected by simply making a change in the key. While this was not considered 100 per cent standardization, nevertheless the change of key width was found to be expedient.

The special forms of Woodruff keys shown in Fig. 18 were used in installations where other methods were not considered appropriate. These were made of rectangular stock with rounded ends to conform to the radius of a regular Woodruff key cutter. The work was traversed past the cutter a number of times until the proper depth was reached. These keys were heat treated and

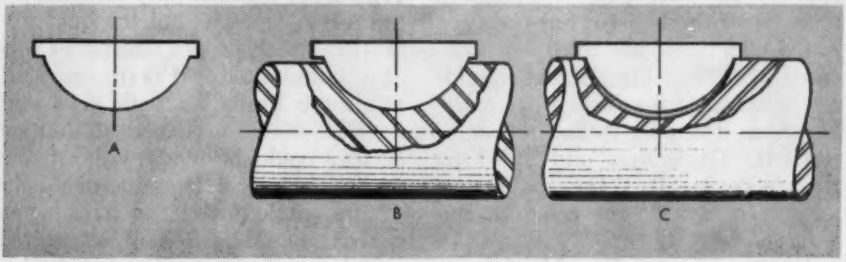


Fig. 19—(A) This sketch shows modification of standard Woodruff key, known as Morton Hi-Pro key. If keyseat in shaft is not cut deep enough, key will appear as shown at (B); namely, with gap at each end of key. If keyseat has been cut too deeply into shaft, as shown in sketch (C), shoulders formed by lugs prevent key from dropping to bottom of cut.

"Maximum and minimum limits for both keys and keyslots were established so that assembly could be made without distortion . . ."

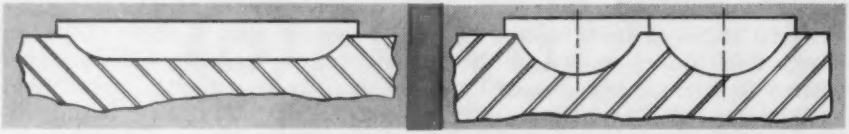


Fig. 20—This sketch shows a longer design of lug-type key, known as a feather key.

Fig. 21—To obtain same effect as feather key, two Hi-Pro keys can be placed end to end.

then subsequently surface ground on the sides.

A modification of the standard Woodruff key is shown at (A) in Fig. 19. This key, known as the Morton Hi-Pro key, is made by The Morton Manufacturing Co., Muskegon Heights, Michigan. Basically it has the same dimensions for width and radius. The length varies slightly in that there are two small lugs at the ends. These lugs bear against the top of the shaft when properly assembled. If the keyseat in the shaft is not cut deep enough the key will appear as shown at (B) in Fig. 19; namely, with a gap at each end of the key. This type of key, therefore, acts as its own gage. Conversely however, if the keyseat has been cut too deeply into the shaft, as indicated at (C) in Fig. 19, the shoulders formed by the lugs prevent the key from dropping to the bottom of the cut. These lugs add but 1/32 inch to the length of the smaller size and 1/16 inch to the medium and larger sizes.

Longer keys of The Morton design, known as feather keys, are made as illustrated in Fig. 20. As in the case of the special Woodruff keys shown in Fig. 18, a traverse cut as well as a plunge cut is required. To get the same effect as a feather key, two Hi-Pro keys of the same size can be placed end to end as shown in Fig. 21. When a key is required to be used with tubing, the rounded portion is flattened considerably, as shown in Fig. 22, so that it will not contact the shaft. Removal of the key without injury to either the shaft or the key is possible. As portrayed in Fig. 23, a chisel cutting edge is pushed under one of the lugs for lifting the key out of the keyseat. Hi-Pro keys are interchangeable with similar sizes of standard Woodruff keys.

Standardization of sizes for Woodruff was not only effected by the A.S.A. in 1930, but the question of fitting with proper tolerances was also culminated. Maximum and minimum limits for both keys and keyslots were established, so that assembly could be made without distortion of the shaft or the necessity of individual fitting, such as when a maximum width key is inserted into a minimum width keyslot or when, without shake, a minimum width key is inserted into a maximum width of keyslot.

". . . cutters are usually made of high speed steel with either fine or coarse teeth."

As for example, if a Woodruff key Number 808 is used, the dimensions being ¼ x 1 inch, the width limits are 0.2500 inch and 0.2510 inch. The width of the keyslot in the shaft has limits of 0.2487 inch and 0.2505 inch. Therefore, a minimum key of 0.2500 inch has looseness of 0.0005 inch in a maximum slot of 0.2505 inch. When a maximum key of 0.2510-inch width is inserted into a minimum width of 0.2487 inch, a press fit of 0.0023 inch results. Although these limits have been set up to facilitate mass production, A.S.A. states that for more particular work a specified fit may be obtained by gaging the finished keyslot and selecting the key required by measuring the width.

To insure that the established tolerances for the keyslots are maintained, the sides of the standardized cutter shown in Fig. 24 must be parallel within 0.0005-inch indicator reading. Center holes have also been standardized which are used when sharpening the cutting edges of the tool.

Keyway cutter manufacturers consider a right-hand cutter as shown standard. This means that it will rotate counterclockwise when looking at the face opposite from the ½-inch diameter shank. All cutters have a ½-inch diameter shank and a length dimension of 2 inches. This does not include the width of the cutter proper. The cutters are usually made of high speed steel with either fine or coarse teeth. The latter has been standardized as 10 and 8 teeth for a Number 204 cutter up to 16 and 12 teeth for a Number 1212 cutter.

Cutters for Numbers 26 through 36 non-standard Woodruff keys having 2⅛, 2¾ and 3½-inch nominal diameters are made for use with a milling machine arbor. They have either a ¾-inch or a 1-inch hole with keyway. They look like side milling cutters but are made without relief on the sides of the teeth so as to maintain keyslot width. Cutters are

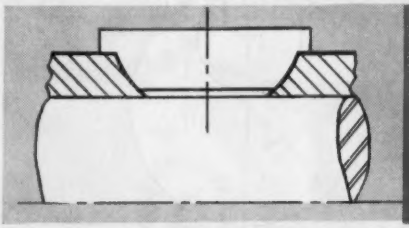


Fig. 22—When a key is required to be used with tubing, the rounded portion is flattened considerably, as shown in this sketch, so that it will not contact the shaft.

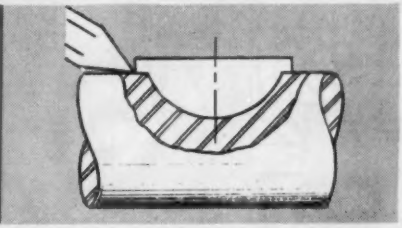


Fig. 23—Removal of the Hi-Pro key without injury to the shaft or key is possible by inserting a chisel cutting edge under one of the lugs, as indicated in this sketch.

". . . A.S.A. standards do not recommend certain cutter sizes for certain diameter work."

also available whereby every other tooth is staggered. These cutters are said to provide more chip space and freer cutting. Indeed, a 1916 issue of a trade paper suggested that each tooth be staggered on a shank type cutter for the same reason. This over and over type of cutter is made of 1/32 inch oversize to compensate for future grinding of the periphery to maintain sharpness. Shank type cutters are also made oversize 0.015 inch to 0.020 inch for the very same reason.

It is significant that the A.S.A. standards do not recommend certain cutter sizes for certain diameter work. Quoting from the "Introductory Notes" of these standards, it says, "No material specifications for keys or shafts have been included because of the widely varying requirements and combinations imposed by the many applications of the Woodruff key and for this reason also no attempt has been made to designate key sizes with respect to the shaft diameters or horsepower ratings." While tables have appeared from time to time suggesting such relationships, it might be well for the draftsman and the mechanic to make their own layouts, as indicated in Figs. 24 through 27. Figure 24 shows the proportions for a Number 808 cutter. In Fig. 25 the smallest cutter, Number 204, is shown to scale. Such a layout can be made two or three or even five times scale and the maximum diameter shaft developed that the cutter will machine without interference. In this particular instance a $1\frac{1}{8}$-inch diameter is the apparent maximum.

In Fig. 26 a scale layout for a Number 608 cutter discloses a maxi-

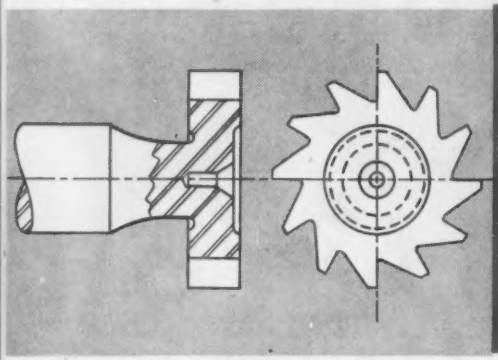


Fig. 24—To insure maintenance of established tolerances for keyslots, cutter sides must be parallel within 0.0005 inch indicator reading.

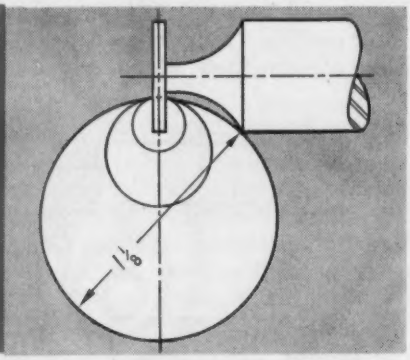


Fig. 25—Sketch showing a Number 204 keyway cutter to scale. Such a layout can be made two or three or even five times scale.

"Length of cutter shank overhang and resultant stiffness influence cutting time and accuracy."

mum shaft diameter of 2 inches. The Number 1212 cutter in Fig. 27 shows that a 6-inch shaft can be cut. However, the shape of the nose of the cutter collet or chuck has a limiting effect on the foregoing method of obtaining shaft diameters. Length of cutter shank overhang and resultant stiffness influence cutting time and accuracy.

While the shank of all standard Woodruff key milling cutters is ½ inch in diameter and 2 inches long to the cutter face, the method of holding and driving varies considerably both in the United States and in England. During World War I, a chuck like the one illustrated in Fig. 28 was in wide spread use. This one has a Number 7 Brown & Sharpe taper shank with the end tapped out for a drawbar. Just ahead of the taper two flats are milled on the collar which are used when the cutter is being clamped in place. In front of these flats are the threads and a tapered nose which is slotted 120 deg. apart as far back as the rear end of the thread. A hex and tapered nut fits over this nose which, when tightened, creeps up the tapered portion of the body and clamps the cutter shank. The ½-inch hole is 1¾ inches deep. The tapered end of the chuck and the tapered hole in the nut are ground, as is the tapered shank. The chuck end is spring tempered and the clamping nut is case carburized and hardened. This collet chuck was intended primarily for use when cutting the smaller sizes of keyslots.

To prevent the danger of slippage during heavier cuts for the larger key sizes, the cutter shank is provided with a small Woodruff key.

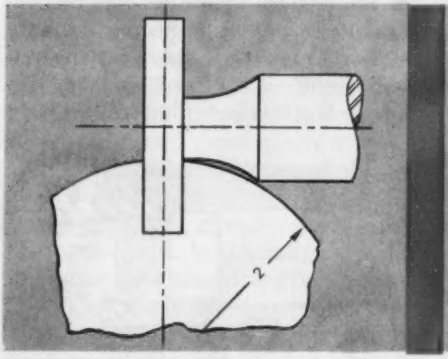


Fig. 26—In this particular sketch, a scale layout for a Number 608 keyway cutter discloses a maximum shaft diameter of 2 inches.

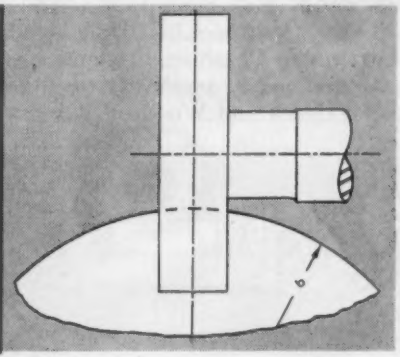


Fig. 27—In this sketch, a scale layout for a Number 1212 keyway cutter shows that a shaft 6 inches in diameter can be cut.

"Another type of positive cutter drive is used in the Scully-Jones method."

This key slides into one of the slots in the nose, thereby preventing the cutter from rotating in the collet during the cutting operation. This design is shown in Fig. 29. As illustrated, the cutter protrudes approximately maximum. It can, however, enter the chuck 1-inch further to reduce cutter overhang.

Another positive type of cutter drive is used in the Scully-Jones method. The standard length shank is squared at the end, as shown in Fig. 30. This square end engages a square broached opening in a tapered sleeve shown in the center of the exploded view. This sleeve is slotted down past the broached square driving hole. The other end is tapped out to receive the drawbar. The taper shank closes around the cutter shank when inserted and drawn back into the tapered shank body on which two flats are milled to facilitate clamping.

Clare Collets, Ltd., Broadheath Altrincham Cheshire, England, also manufactures a positive type drive collet chuck and Woodruff key cutter. The cutter is similar to the American standard type but one end of the shank has a special shape. Referring to Fig. 31, the end of the shank is first turned down slightly below the ½-inch diameter, which is then milled with parallel flats. This diameter is again milled with two other flats, each flat starting on a center line and terminating on the other center line 90 degrees around. Section *A-A* in the center, which is enlarged, shows the shape of this patented tang and latch in dot and dash section lines. View *B* will be explained later.

The chuck, which is used with the cutter is shown in Fig. 32. It consists of a body having a tapered shank which fits the spindle of a milling machine. This shank is drawbar tightened. The front end is bored and ground out tapered, this taper running out into a straight portion at the bottom of the hole to accommodate a tapered sleeve, suitably slotted to facilitate clamping the cutter shank. The front end of this sleeve is straddle milled to the shape

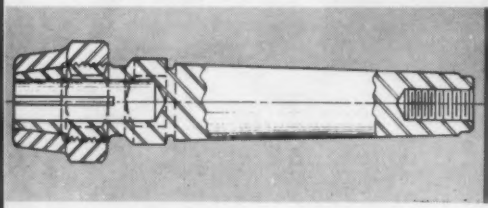


Fig. 28—Sketch showing type of keyway cutter chuck which was widely used during World War I. Chuck has Number 7 B&S taper shank.

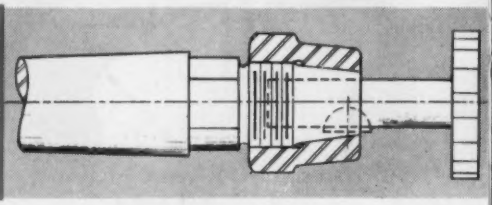


Fig. 29—To prevent slippage, cutter shank is provided with small Woodruff key which slides into one of the slots in collet nose.

"The nut and tapered sleeve turn integrally as the cutter is being clamped."

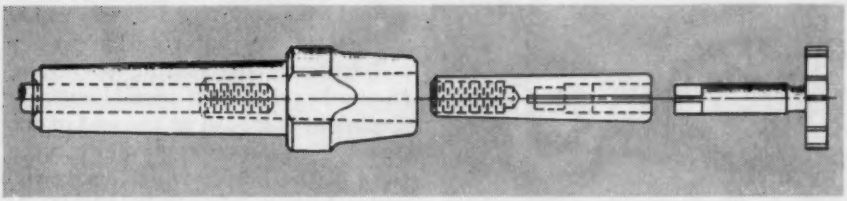


Fig. 30—This sketch clearly shows the Scully-Jones positive type of cutter drive.

shown in the end view at the left. Upon this flattened and rounded end the nut is centered and, of course, on the threaded end of the chuck body. The nut and tapered sleeve turn integrally as the cutter is being clamped. The bore of this tapered sleeve is really the driving medium. First the ½-inch hole terminates in a grinding relief. Between this relief and the rear end, the shape of the opening is as shown at *C* in the sketch (see end view also).

After the cutter is inserted so that the flattened end of the cutter shank enters the hole *C* properly, it is twisted counterclockwise, as illustrated in the cross section view *B* in Fig. 31, until the sides *X* contact. The two small triangles so formed, shown shaded, overlap and rest against the end of the tapered sleeve. The end of the cutter shank is therefore within the straight portion of the tapered hole in the body. The direction of rotation during the cutting operation is shown in view *B*. The chuck is self-tightening against the pressure of the cut so that slip or creep of the cutter is eliminated.

Another method for holding a Woodruff key cutter positively is illustrated in Figs. 33 and 34. This chuck is the product of Clarkson Ltd., Nuneaton, Warwickshire, England. The American office of the company is located at 320 Ontario St., Toledo, Ohio, under the name of Clarkson Incorporated. Known as the "Autolock," the chuck features a ½-inch cutter shank, threaded at the end. In Fig. 33, a collet, suitably slotted (not shown) forms the cutter shank receptacle. The hole is ground and the rear end is threaded. A sleeve fits over the collet against the end of which the clamping nut bears. As the nut is tightened it presses the sleeve up the tapered nose of the collet, thereby clamping the cutter. As

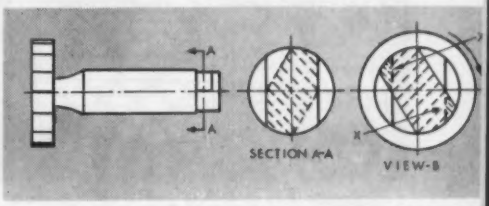


Fig. 31—This sketch shows a British design of Woodruff key cutter which features a shank having a special shape on one end.

". . . curved tooth design permits smoother finish, increases cutter life and requires less hand feed pressure . . ."

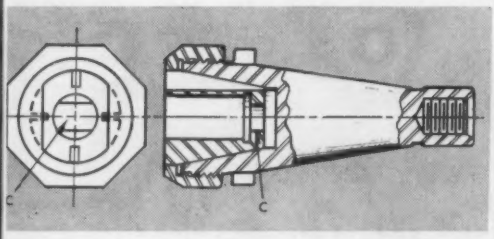


Fig. 32—British design of positive type drive collet chuck for a keyway cutter. The chuck has a body that has a tapered shank which fits the spindle of a milling machine.

the cutter is screwed into the hole, the center hole in the shank is engaged by a small center in the body of the chuck. The enlarged view in Fig. 34 shows this arrangement. Therefore, end thrust is absorbed, the thread prevents rotation and the front end of the assembly locks the cutter in place.

In one other instance of cutter design, a flat in the center of the length of cutter shank was milled to accommodate a set screw. The shank itself is held by a collet, and the set screw is used to prevent rotation in the collet during the cutting operation. In another design of special cutter a single flat is milled at the end of the shank. This flat contacts a key in the body of the holder which keeps the cutter from turning in its socket.

Ordinarily the teeth of a Woodruff key cutter are cut straight across the face, the cutting edges thereby being parallel to the axis. However, cutters manufactured by the Aber Engineering Works, Inc., Waterford, Wis., have curved cutting edges. They are so designed as to provide strength at the corners and, because of the shearing action imparted, are said to operate unusually fast and easy. It is further stated that this type of curved tooth design permits a smoother finish through the absence of chatter, increases cutter life and requires less hand feed pressure while plunge cutting operation is performed.

Procedures for inspection of key-

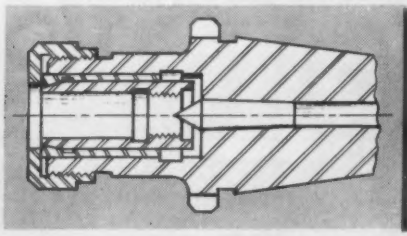


Fig. 33—Sketch of British-made key cutter chuck featuring a ½-inch cutter shank, threaded at the end. A collet suitably slotted (not shown) forms the cutter shank receptacle.

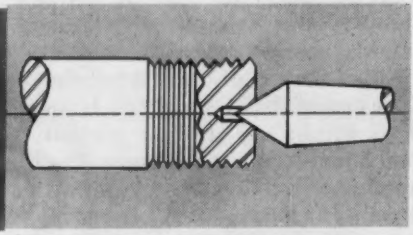


Fig. 34—Enlarged view of portion of chuck illustrated in Fig. 33, showing how, as cutter is screwed into hole, center hole is engaged by small center in body of chuck.

slots vary in different manufacturing plants throughout the country. In some places a scale measurement from the edge of the slot to the bottom at the center suffices. Automobile plant drawings have been observed which require a micrometer dimension, as shown in Fig. 35, from the bottom of the slot to the opposite side of the shaft as shown at *A*. Two limits are given, only 0.002 inch apart. In another instance a small assembly sketch is shown with a decimal dimension from the top of the assembled key to the opposite side of the shaft, as indicated at *B* in Fig. 35. Usually there is a 0.010 to 0.015-inch clearance from the top of the key to the broached surface of the keyway in the mating piece. Therefore, some inspectors frown on the latter method. They claim that for final assembly this might be proper, but for detail inspection at the milling machine or on the inspection bench it requires handling and assembling one more piece. They prefer inspecting the open keyslot.

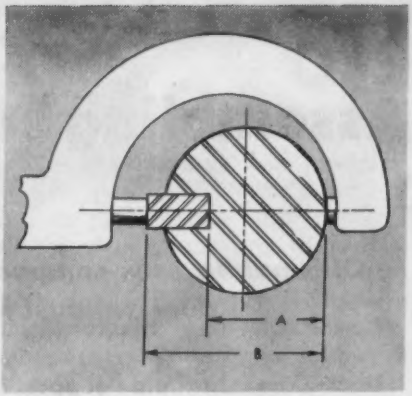


Fig. 35—Drawings have been observed which require a micrometer dimension from the bottom of the slot to the opposite side of the shaft, as shown at (A) in the sketch here.

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ASME Handbook: Engineering Tables. Edited by Jesse Huckert. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. 704 pages. Cloth binding, board covers. Price, $12.00.

In this reference book, one of the four volumes comprising the A.S.M.E. Handbook, engineers and designers now have available many tables of recognized design standards of the type not commonly found in handbooks. Typical of these are the table of involute functions—methods for finding loads on ball bearings—and information on bars and tubes suitable for reworking into gears, levers, shafts or screws. This practical volume makes design calculations easier and saves the engineer time. It places in his hands a wealth of the most useful design tables to supplement his knowledge of standards for shape, dimension, gears and the like.

The contents of the book are conveniently arranged in 15 sections, grouping together tables which apply to the design of specific parts. It covers such subjects as bar stock and shafting; bearings; spur, helical and herringbone, bevel and worm gears; cylindrical fits; keys and keyseating; bolts; springs; aircraft and mechanical tubing; serrations and splines; electrical motors; and gaskets.

Assembling Tailpipe Supports

Oldsmobile uses compact press setup to assemble dual exhaust tailpipe supports.

Dual exhaust tailpipe supports are assembled at the Oldsmobile plant in Lansing, Michigan, on a pressure sensitive hydraulic Denison Multipress while the shaft is simultaneously assembled in the bushing. Figure 1 below shows this efficient press setup.

Each assembly consists of two offset stamped arms with a hole in each end, a shaft having shoulders on each end, and a bushing assembly

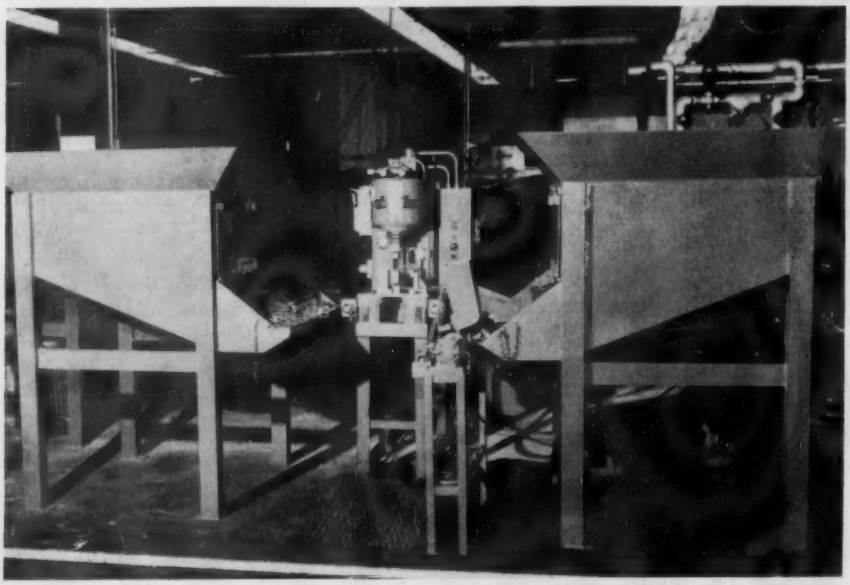


Fig. 1—Press setup used in Oldsmobile plant to assemble stirrup-like tailpipe supports. An air cylinder, on the bushing assembly fixture, forces the shouldered pin on the rubber bushing while the press is simultaneously staking both ends of the shaft to the offset arms.

". . . operator, when removing bushing and shaft assembly from fixture, positions a new bushing assembly in V-block."

consisting of a rubber bushing which is secured in a metal retainer. The shafts are hand loaded on a magazine, and the bushing assembly is placed on a V-block directly in line with the magazine. An air cylinder on this fixture (Fig. 2), which is actuated by the press controls, forces the shoulder shaft into the bushing assembly. When the shaft is properly inserted in the bushing, the air cylinder reverses, permitting a new shaft to discharge into assembly position from the magazine. The operator, when removing the bushing and shaft assembly from the fixture, positions a new bushing assembly in the V-block.

The bushing and shaft assembly is then positioned in the 6-ton hydraulic press fixture with each end of the shaft protruding through a hole in the end of the offset arm. The press and shaft assembly fixture are then energized by the same two palm buttons. The press stakes each end of the shaft, securing the offset arms to the shaft while the shaft assembly fixture is simultaneously inserting a shaft in the bushing assembly, which was previously positioned in the bushing and shaft assembly fixture.

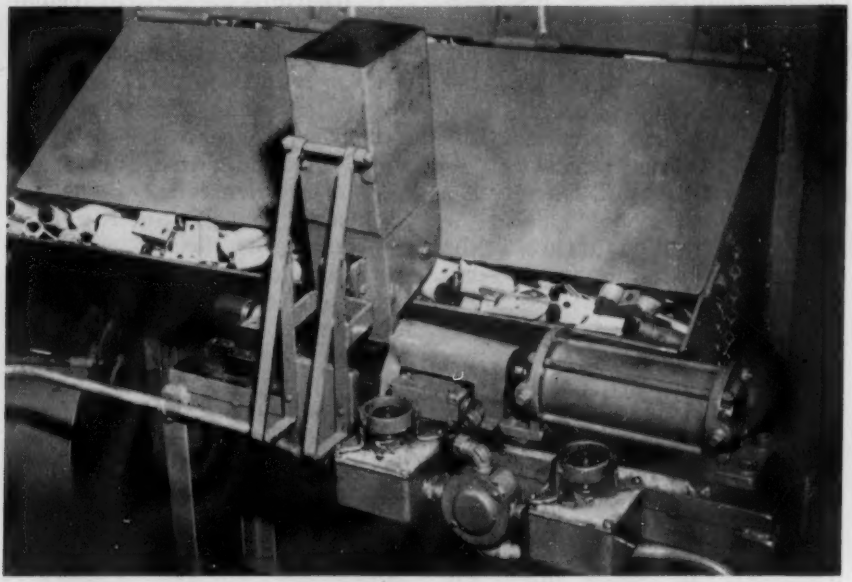


Fig. 2—Close-up view of the shaft-to-bushing assembly fixture, showing the magazine for shafts, bushings and air cylinder. The fixture is normally actuated by the hydraulic press palm buttons; however, separate palm buttons are provided for setup purposes.

Safe Mounting Method For Small Diameter Piercing Punches

Discussion covers unusual method for preventing punch breakage in die operations.

By W. M. HALLIDAY

The accompanying drawing shows an unusual, yet simple, method of mounting small diameter piercing punches which has been found to eliminate the danger of bending or fracturing such punches when they inadvertently become overloaded during operation. With a particular die construction, utilizing three cylindrical punches of unusually small diameter, difficulty was continually experienced due to the tight jamming of waste slugs in the die opening. After every few descents of the punches it was found that the slugs became trapped in the mouth of the die opening, thus preventing the punches from moving the correct distance through the work. As a result, the punches were frequently severely bent or fractured, and the cost of replacing such damaged parts was prohibitive.

Moreover, the die was designed to punch holes in right-hand and left-hand mating components. Certain holes, however, were not common to both styles of component; that is, when piercing the left-hand pieces, one of the piercing punches had to be removed.

To overcome the frequent regular shut downs involved in replacing damaged punches or in removing one punch not required when piercing the left-hand components, some means had to be provided in the punch mounting whereby die elements were automatically safeguarded against damage arising from trapped-slug overload. The mounting also had to permit the desired punch to be disengaged quickly, easily and without having to disturb the setting of the die on the press when punching operations are performed on left-hand components.

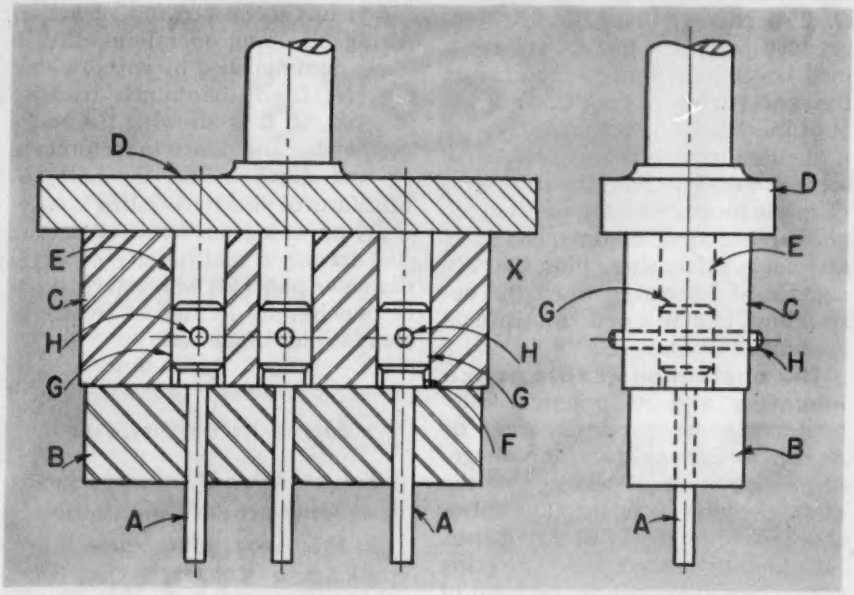
The design of mounting shown has been found to meet these various requirements. Its construction comprises the three punches, *A*, all of the same size and having a standard head pattern. The working shanks of such punches are extremely long compared to their small diameter, thus making them readily subject to

damage. The punches are arranged so as to slide easily, yet closely, within the holes in the punch-plate, *B*. This steel member is permanently fastened to the rectangular cast-iron spacer block, *C*, which in turn is fastened to the standard type punch holder, *D*.

Three parallel holes, *E*, are accurately drilled and reamed completely through the spacer blocks, each hole being situated in exact vertical alignment with its corresponding punch, *A*, as shown. These holes are the same diameter, which latter dimension is made approximately 1/16 inch larger than the diameter of punch head, *F*, to avoid interference with same. When the punches are in the proper operating position, heads, *F*, lie at the lower end of holes, *E*, to rest on the punch plate, *B*.

Members, *G*, are short cylindrical pieces of case-hardened and ground steel, which are fitted to slide closely, yet smoothly, within their respective holes, *E*. In the particular setup shown, the three members are exactly the same length; however, this is not an essential requirement, since the length may be readily varied to suit the thickness of stock being punched or the amount of inactive sliding movement required on a punch to make it inoperative for piercing.

In this case, the length of members, *G*, is shorter than holes *E*, by the distance denoted at *X*. This latter distance is that required to ren-



This drawing shows an unusual, yet safe, method devised for mounting small diameter close-center piercing punches in a die to prevent punch breakage during die operations.

der a punch inactive in a manner to be explained shortly. The thickness of spacer block *C*, is, of course, predetermined to insure such a length, *X*, of sliding movement to the members, *G*, and punches, *A*.

Each end of the members, *G*, is amply chamfered to prevent the part from binding within the hole and the two endfaces of each part are ground absolutely flat and concentric. In each case, the member, *G*, is positively retained in working position by a pin, *H*, which is pressed tightly within a hole drilled and reamed through the spacer block, *C*, and also diametrically through the member, *G*. The ends of the pins are well rounded and they project about 1/8 inch beyond each adjoining side of the spacer block to facilitate removal of the pins. The pins are made of a medium-hard grade of brass and serve not only to hold the members, *G*, in the proper working position for normal punching requirements, but also act as safety shear pins, that are capable of fracturing when the descending punch meets an undue amount of resistance.

The application of this punch mounting and its practical safeguarding features will doubtless be readily understood from the foregoing constructional details and the accompanying drawing. The latter shows the three identical punches, *A*, mounted correctly for piercing duty. As will be noted, the head of each punch is backed up firmly by a pinned member, *G*, so that the punch has no endwise movement in the punch plate, *B*.

If one of the punches becomes distorted or misaligned with the die opening or when waste slugs jam up that opening, the additional resistance thereby presented to the downward movement of the punch causes pin, *H*, to shear in two. As soon as this occurs, the member, *G*, and punch, *A*, slide harmlessly into hole, *E*, and the punch cannot penetrate into the stock. Even though such an obstruction in the die and the resultant shearing of pin, *H*, is not immediately noticed by the operator, no damage can be done to the delicate punch, since the punch merely shuttles up and down in hole, *E*, instead of cutting into the stock.

In cases where one particular punch has to be put out of action during punching operations, this is easily accomplished by withdrawing pin, *H*, from the punch backing member, *G*, thus allowing the backing member and punch to reciprocate up and down within the hole, *E*. This form of punch mounting is especially advantageous for safeguarding dies having a multiplicity of small diameter punches, where such types of punches are located at relatively short center distances.

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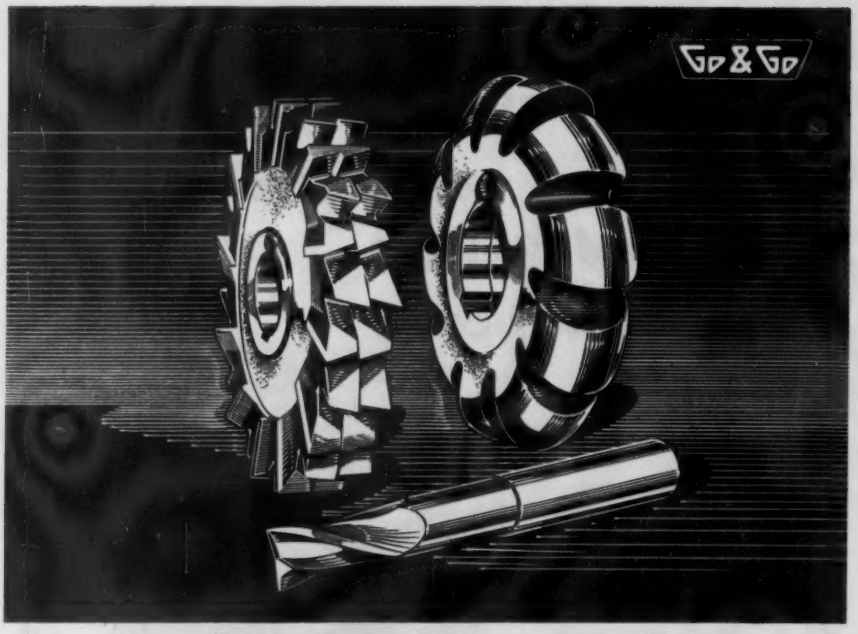

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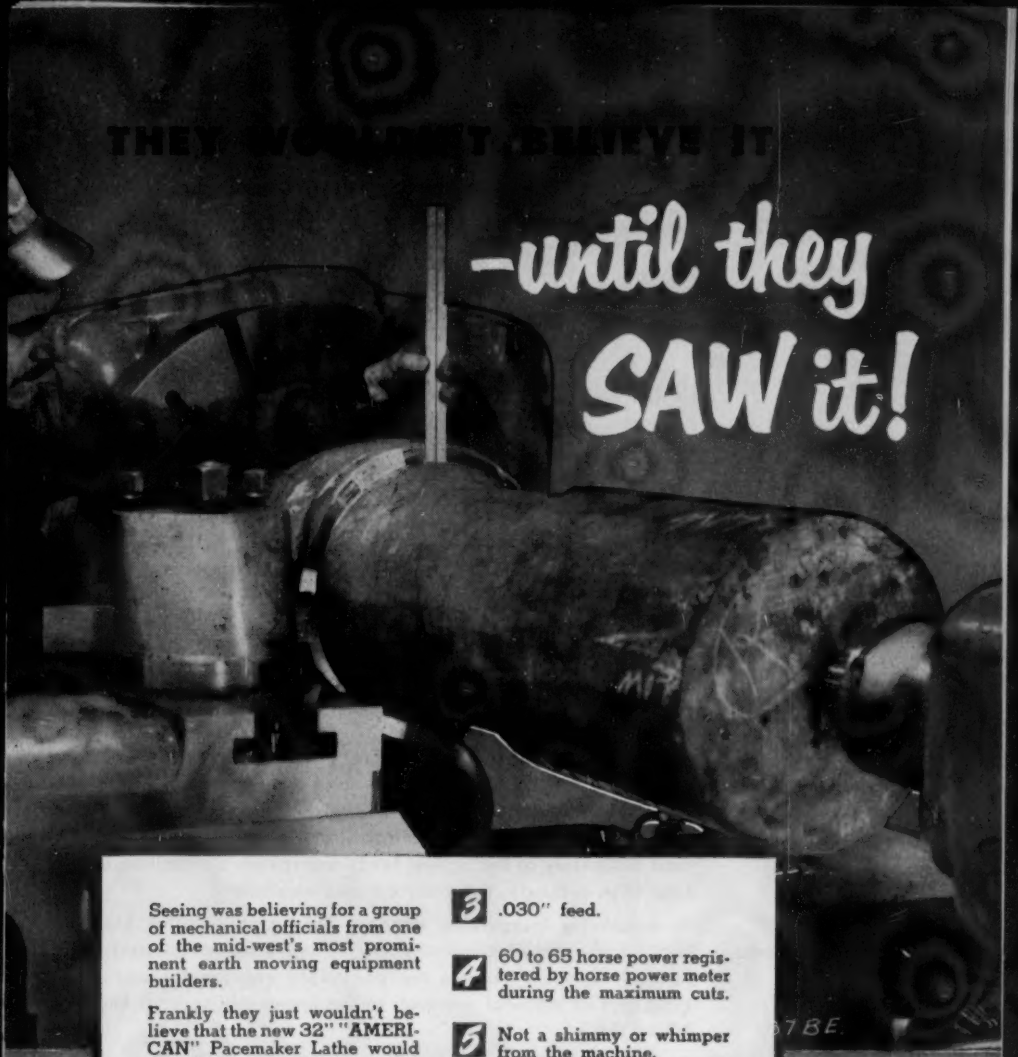

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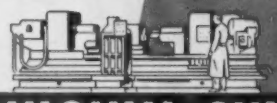
HOW TO MEET SHORTAGES OF ENGINEERS AND HIGHLY SKILLED WORKMEN



A number of remedies for this very disturbing situation are suggested.

By ALFRED M. COOPER

The shortage of engineers and highly skilled workers in industry can no longer be considered acute. It has become a chronic condition and, assuming continued full employment, it will not at once improve.

There have not been enough machinists and tool and diemakers to go around since 1938, and the old army game of enticing good men away from competitors has of necessity been perfected to a fine art. This practice may alleviate to some extent, but it does not cure, such shortages.

In 1938 our colleges were turning out a superabundance of engineers —some 13 times as many as there were engineers then employed in industry. But during and after World War II our need for technically trained men mushroomed. In the postwar period the GI training program functioned to supply this increased demand.

But in 1950 we hit a peak of nearly 53,000 engineering graduates, and since then, year after year, the supply has diminished — to 42,000 in '51, to 30,000 in '52, on down to 22,500 in '55. *This at a time when the nation's overall employment was increasing year after year.*

Any lasting cure for shortages of engineers must, of course, take the form of better teamwork between those authorities in our high schools and colleges who are responsible for vocational guidance and those experts in industry and government whose business it is to prognosticate the rate of growth of our industries. As of now it would appear that we have all been a bit over-cautious in our estimates of future manpower needs.

Traditionally, the largest employ-

ers have each year taken the cream of the crop of engineers; yet even the largest of these now experience difficulty in satisfying their replacement and expansion needs in this field. Thus, it becomes interesting to note the many ingenious methods that have been adopted in meeting shortages of qualified engineers.

As a result, both large and small plants are encouraging high school graduates among their employees to continue their education through university extension courses. All tuition costs for courses thus approved by management are defrayed by the company, and scholarships are awarded employees who have been selected as demonstrating potential leadership ability.

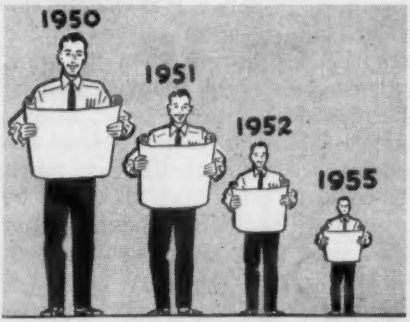
Again, where there are universities located nearby, plants are hiring engineering students as part-time employees, and from among these an effort is made to chose those who will qualify as permanent members of the engineering staff after graduation. This method of meeting shortages also has the advantage of functioning as an on-the-job orientation school for new engineers.

Personnel officers contend that where it is possible to select and upgrade employees within the ranks it becomes practicable to secure, not only proficient engineers who are thoroughly familiar with plant manufacturing routines, but better material for promotion to higher executive positions. Obviously, either the upgrading of shop employees, or the hiring of part-time student engineers, may be preferable as a method of selection to employing bottom-of-the-barrel among the annual crop of engineering graduates. And this may be all that is available to the smaller plant.

Again, existing shortages have been alleviated by selecting non-engineering graduates, preferably those who have majored either in mathematics or physics, and training these as engineers. It has been found that 5-month courses can convert such men into good engineering assistants. Here again, it is possible to more carefully select these men for their leadership qualities.

Always in such cases the larger plants have the advantage, since these can better absorb the cost of an elaborate, formal training program. But it has been found practicable to assign two or three such non-engineering graduates as assistants to engineers, thus relieving the engineers of much detail work and freeing their time for broader, more important phases of design activity.

It is also true that personnel exe-



SHOWING DECREASE OF ENGINEERING GRADUATES 1950-'55

"This at a time when the nation's overall employment was increasing year after year."

". . . the time of engineers is too frequently taken up with detail work of a purely clerical nature . . ."

cutives are beginning to look with definite disfavor on the employment of engineering graduates as draftsman. This time-honored method of inducting engineers is now considered wasteful. It has been found that high school graduates can be developed into competent draftsmen, and this again permits the engineer to concentrate his efforts on legitimate engineering work.

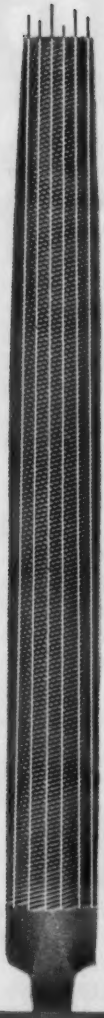
Then too, it is often found that the time of engineers is too frequently taken up with detail work of a purely clerical nature which in itself does not call for engineering skill. This may include the operation of computing machines, and it has been found that no sacrifice in efficiency results when experienced women computing machine operators are substituted for engineers.

In connection with this general shortage problem it frequently develops that job specifications call for engineering degrees when the work in many instances could as well be handled by those of lesser attainments. This is a carryover from the days of surplus technical help when it would be often said, "It would be nice if we could have engineers on this job." But when these are in short supply it becomes evident that the job actually does not require an engineer.

Whether by substitution of men and women of lesser qualifications, or by upgrading present employees into engineers or assistant engineers, anything that frees the engineering force from duties that can as well be handled by others certainly increases the effective supply of engineering talent available. Most experts caution that efforts to induct too many nonengineering employees into engineering work may have a deleterious effect on the quality of imaginative design. In the long run, the answer to engineering shortages must, of course, take the form of guidance of more students into this field.

Undoubtedly, the impression prevailed among vocational counselors that the GI training program might well flood the labor market with engineers, and students were cautioned about preparing for an overcrowded profession. The steady increase in overall employment, year after year, has been something

". . . larger plants can better absorb the cost of an elaborate training program."



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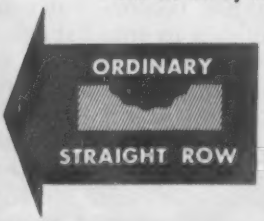
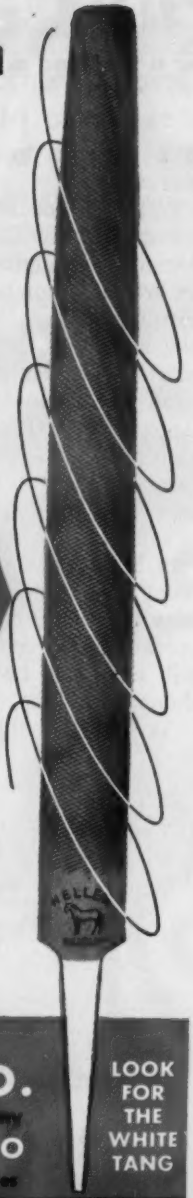


Above is a cross section showing the smooth, true arc left by the HELLER SPIRAL-CUT HALF ROUND file with a straight stroke. Compare it with the scalloped surface (illustrated below) left by an ordinary half round file using the same stroke.



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". . . there can be no satisfactory substitute for a tool and diemaker . . ."

of a surprise to close observers everywhere.

In time, of course, our public educational plan will catch up with the demand for engineers, and thereafter we may not be further plagued with such shortages. In the interim, one or more of the remedies suggested above, which have been found effective in a number of plants, both large and small, may alleviate engineering force shortages. In some cases it will be found that the necessary changes (such as substitution of women computing machine operators for engineers and the employment of non-engineers as draftsmen) may be considered so effective and economical that engineering skill will no longer be dissipated on less demanding jobs.

It is reasonable to assume that our system of higher education eventually will take care of all of our needs for engineering skills. But what agency is going to furnish those highly skilled artisans that appear to be forever in short supply?

Back in '38, when we were training 13 times too many engineers, we were also training, in every type of apprenticeship course or trade school, but one-seventh of the number of highly skilled workers needed in industry. When the great expansion of our defense industries occurred, in 1940 and afterward, we found it necessary to break down skilled trades, such as those of machinist and millwright, and quickly train thousands of semi-skilled young men and women to take the place of a non-existent all-around journeyman.

Since then, this method of spreading skills among a number of workers has become common practice. Yet it is as true today as it was in '38 that there can be no satisfactory substitute for a tool and diemaker when this is what the job calls for. *It is uneconomical to substitute four or five semi-skilled medium-paid workers for one or two highly skilled artisans,* and only necessity should force us to make this standard personnel practice.

In a war emergency, obviously any steps, economical or otherwise, are justified, if only these result in adequate production of planes and munitions. But in time of peace, emergency measures should be carefully scrutinized, and where these

". . . uneconomical to substitute 4 or 5 semi-skilled for 1 or 2 highly skilled workers."

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". . . the system of public education should take care of the need for highly skilled artisans . . ."

"Unless he has mastered commercial subjects in high school he may be unemployable . . ."

are found to be unsatisfactory they should be scrapped. Thus, it may be well to consider the reasons behind our continued shortage of skilled workmen, and then take whatever steps are called for in order to remedy matters.

The principal agency today for the production of highly skilled workers is the apprenticeship training school. And, of course, such schools are ordinarily operated as a part of the works training division of the larger manufacturing corporations. No small plant can afford the cost of such a school.

Naturally, such concerns are primarily interested in training artisans for employment in their own plants, and enrollment in these schools is limited in number to the estimated future needs of the company for replacements and foreseeable expansion of work force.

Aside from these corporation apprentice schools, other forms of apprenticeship training have been traditionally restricted in order to guard against any flooding of the labor market. And, of course, the privately operated trade schools concentrate entirely on turning out, in short courses, more and more semi-skilled workers. To the best of our knowledge, there is no trade school in the United States, either publicly or privately owned, that is equipped to teach a four-year machinist course. And you can't make a machinist in less time than that.

Thus, the smaller plants have no reliable source from which to secure qualified artisans of the type of machinists and tool and diemakers. There can be no substitute for a four to five-year training course for developing highly skilled workers, and this is an impossibility in the small plant. This is the situation that often leads the smaller plant to "hire away" workers wherever they can be obtained. I recently saw a plant employing 2,500 workers on Monday go into production with a work force that had been employed elsewhere two days earlier.

Obviously, in a great industrial democracy, the system of public education should take care of the need for highly skilled artisans, as well as the development of scientists and surgeons. Just as our colleges supply competent engineers, so

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Super Sensitive
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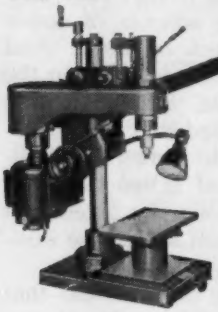

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"The graduate of an academic high school of today . . . is in an unenviable position."

should our secondary schools supply machinists, electricians, masons and a score of other types of highly skilled workmen, all graduates of four-year trade courses. Such courses should parallel our present high school courses in highly industrialized areas.

As of now, we teach a smattering of industrial subjects in a very few public trade schools, scattered from coast to coast in our largest cities. In these schools only low-skilled trades are taught. Not one teaches a highly skilled trade, and none is adequately equipped or staffed for such teaching.

Yet it is altogether practicable to teach a highly skilled trade in a public trade school course of four years, *and at the same time give the student all of the essentials of a high school education.*

The graduate of an academic high school of today—one who must go to work rather than continue on to college — is in an unenviable position. *Unless he has mastered commercial subjects in high school he may be well-nigh unemployable, except as the rawest of raw material.* All of his training, during the most formative years of his life, has gone to prepare him for college entrance, yet for any number of good reasons he cannot continue on to college.

We now have, in America, more than 25,000 high school shops. Of these, more than 10,000 are of a type that could readily be converted for trade training. Actually, only a small percentage of this number would be required for conversion to secondary trade schools, and these would, of course, be located only in our heavily industralized areas.

As of now, high school shops are used primarily for manual training. Neither the equipment nor the instructors are adequate for the teaching of skilled trades. But proper equipment for this purpose often is furnished gratis by local manufacturers, once the management of these is assured that bona fide trade training will be carried out in these shops. And it has been found that highly skilled artisans, carefully chosen and given a short teacher-training course, make excellent trade teachers.

When this change-over has been made, it will be found that our secondary school system can function to supply skilled workmen for all of our plants, exactly as do the apprenticeship training schools of today within the largest of these. And when trade training is given in the secondary schools, the curriculum can be so controlled that such training can be made part of a well-rounded course of instruction that prepares the student for intelligent citizenship, as well as for the business of earning a living.

It is deeply to be regretted that the term "industrial school" has come to be synonymous in many minds with "reform school." Certainly there can be nothing shame-

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"The most formative years of a boy's life are those years between 14 and 18."

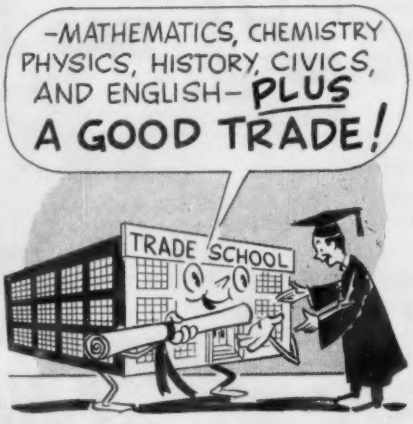
ful connected with training youngsters in trade skills; the graduate of such a public trade school as we are discussing will be able to command a much better wage than the graduate of the academic high school who must go to work. He will, of course, not yet be a journeyman machinist or millwright, but he will qualify for such rating after two years of work experience.

Because our secondary schools are not now fulfilling their complete function, we find an unfortunate situation existing within many of our junior colleges. None of these schools teach skilled trades, yet students who are preparing for their junior certificates, and who expect to complete their education in other schools, often are required to spend too much time on shop work. These students can never qualify as highly skilled artisans, and it is questionable whether the amount of shop training they are given makes them better engineers.

Shop training, along with training in typing and shorthand, belongs in the secondary schools. The most formative years of a boy's life are those years between 14 and 18. If you doubt this, discuss with a lad of those years any subject in which he happens to be keenly interested, and see how quickly he leaves you floundering. Yet in most such subjects—television, airplanes, hot-rods — he will be almost wholly self-taught. It is during this period that manual dexterity such as is called for in the highly skilled trades may be most readily acquired.

A famous Chicago brain surgeon once told me that he served an apprenticeship as machinist before ever he studied medicine, and that his superb skill with the most delicate instruments was attained in those early years in a machine shop. He was emphatic in the opinion that the average surgeon was handicapped in not having had early training calling for a high degree of manual dexterity.

Trade training in secondary schools will in no important degree interfere with any student's academic education. It means only that in certain localities a number of four-year secondary trade schools will be made available to students who are not going on to college. The courses



"A properly equipped trade school would offer courses leading to a skilled trade."

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For more data circle **304** on Reader Service Card

". . . properly equipped schools offer courses in skilled trade."

in these schools may be readily designed so that any student, after two years in such a trade school, may transfer to any desired academic high school, should a change in plans warrant such a transfer.

Indeed, the curriculum for such a four-year trade school would be such that its graduates would lack only a foreign language, as compared to the attainments of the conventional high school graduate. His education in essential related subjects — mathematics, chemistry, physics, history, civics, and English—would be altogether adequate. And in addition, of course, the graduate of such a school would have mastered a very good trade. *A properly equipped public trade school would offer twenty or more courses, each leading to high proficiency in a skilled trade.*

With trade training an integral part of our secondary educational system, we would have firm control of the *number* of skilled workers to be trained in a certain period—something that is impossible to attain today, even with the doubtful output of our private trade schools. And the quality of trade instruction would be uniformly excellent,

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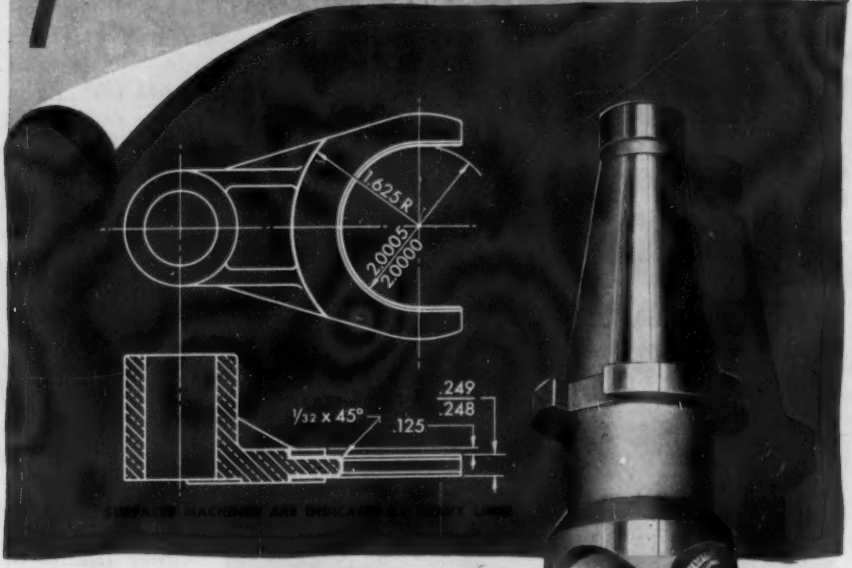

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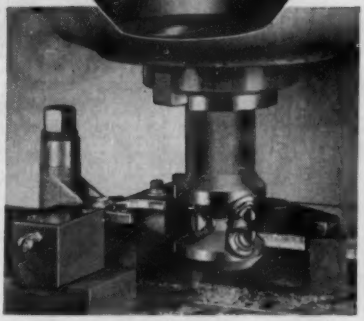

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For more data circle **306** on Reader Service Card

"Our public school system is enormously costly."

which is in no sense true today. There would be no flooding of the labor market and no mass-production of half-trained, semi-skilled workers.

Trade training in secondary schools would in no way curtail manual training instruction in the academic high schools. The present nationwide wave of do-it-yourself activity is ample proof of the deep-seated urge within every citizen that he should be permitted to express himself by doing something useful with his hands. Manual training is an important part of the training of the academic student. But manual training has no real relationship with trade training, and it should be confined to the high school. The manual training teacher is not qualified to teach a skilled trade.

Oddly enough, it is only in industrial training that our public school system has been remiss. Other forms of vocational education, such as commercial and agricultural, are well taught in our present-day high schools. This is indeed an odd omission in the educational system of the greatest of all the industrial democracies.

Our public school system is enormously costly. In plant and personnel it represents our larg-

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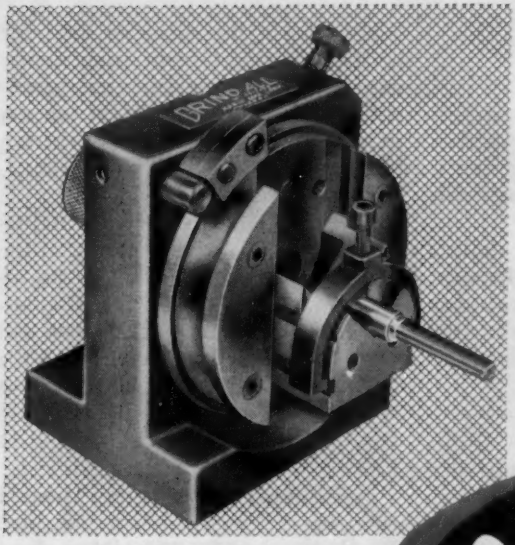

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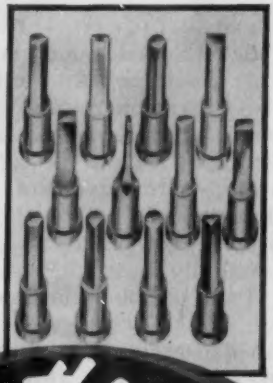

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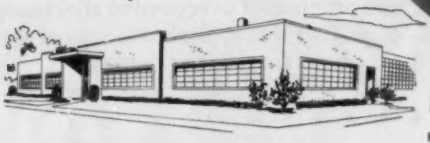

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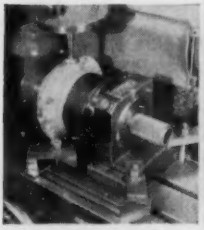
Here is higher accuracy, greater range and maximum speed in grinding perforators. Meets the requirement for a more versatile perforator grinding attachment. Grinds many irregular shapes concentric with shank.

Also performs other functions such as light milling and boring fixture, inspection tool, etc.



BORING FIXTURE

INSPECTION TOOL

Harig

Manufacturing Corp.

2655 W. HOWARD ST., CHICAGO 31, ILL.

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est single industry. No one begrudges this cost, but certainly every effort should be made to insure the greatest possible return from the expenditure of the school-tax dollar. Adding training in the skilled trades to our existing types of vocational education will balance up our educational effort. Right now this effort is woefully lopsided.

It will be noted that there are certain similarities between the problem of meeting engineering shortages and that of coping with shortages of highly skilled labor. In each instance we use the real thing when we can get it, and when we can't we substitute something else.

Since the solution of both of these shortage problems can be found within our system of public education, and nowhere else, obviously this is the place to look for permanent relief from such shortages. In either case, the remedy cannot be applied overnight. It takes a minimum of four years to train either an engineer or a machinist. And in the case of the machinist it will be further necessary for industrialists to insist that training in the highly skilled trades be made an integral part of our system of secondary education. This will in turn call for some changes in concept of the purpose of secondary education—a broadening to include the intent to train youth for industry, as well as for commerce and agriculture.

Even then it will require further time to re-equip numbers of high school shops as trade training shops and to train highly skilled, experienced artisans as teachers. But if this is the best eventual solution to our problem of overcoming shortages of skilled labor, then the sooner we set about the job the better.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Special Machine Handles Large Parts

The special, three-way, horizontal and vertical milling, drilling and tapping machine, illustrated herewith, was developed for handling large parts by Michigan Drill Head Co., Detroit 34, Mich. It is tooled to handle 70-pound transmission housings for a leading truck manufacturer, with a production rate of 50 housings per hour at 100 per cent efficiency.

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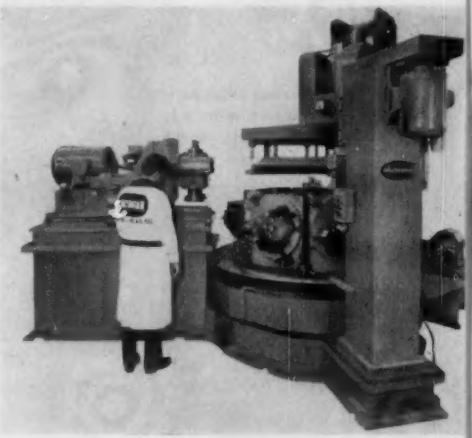
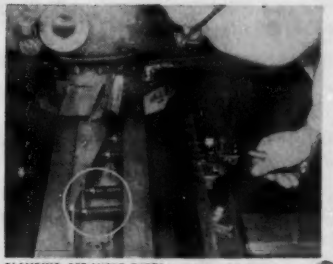
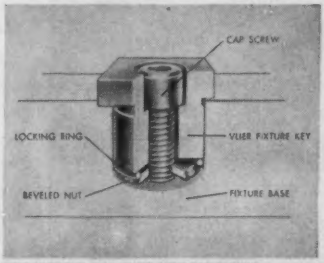


What can be done to lower YOUR tooling costs?

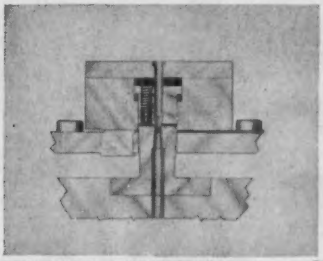
Thousands of companies are making drastic savings by using standard Vlier Tooling Specialties instead of costly custom-made substitutes. The applications shown below are only the *obvious* uses for these simple, inexpensive tooling specialties.



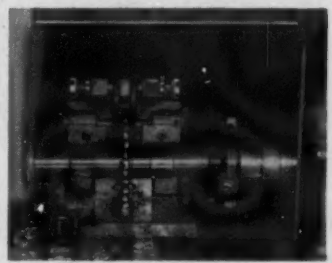
CLAMPING OFF-ANGLE PARTS in jigs and fixtures is a cinch with Vlier Swivel-Pad Clamps. Pad swivels on a ball, 7½° each side of center line. Can't bind or damage part surface. Socket set models can be inserted from either end.



NEW FIXTURE KEY WITH INSTANT-ACTING, INTEGRAL LOCK eliminates unnecessary drilling and tapping operations to mount keys in fixture base. Holds key securely, permits quick change of key size for different table slots. Insures perfect alignment of jigs and fixtures on table.



NEED ACCURATE, UNIFORM SPRING LOADS? Vlier Spring Plungers really pay off when positioning parts in jigs and fixtures. Spring loads are accurately set at the factory; stay constant. Plunger telescopes completely.



THE RIGHT AMOUNT OF CLAMPING PRESSURE AND NO MORE! There's no distortion of the part when Vlier Torque Thumb Screws are used to clamp it in the jig or fixture. Once predetermined end pressure is reached, the head turns freely. Working parts are protected from foreign matter.

Where can your tool room save?

Chances are, you can think of dozens of uses for standard Vlier Tooling Specialties — applications where expensive, complicated, home-made devices are now being used. *Why not write for your copy of the new 1956 Vlier catalog today?*

Originators of small parts that make a big difference in tooling costs!

VLIER ENGINEERING INCORPORATED

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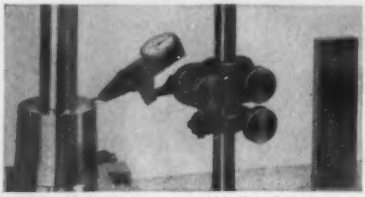
CHECK MASTER contact point on work piece shown 12 times actual size. To see the smallest variations CHECK MASTER will detect, illustration would need to be 500 times actual size.



CHECK MASTER in use checking face location on surface plate.

The importance of measuring practically nothing

In gaging, the smaller the variation, the harder it is to measure. Yet, accurate checking of microscopic variations is what makes the difference between ordinary and truly fine precision manufacture.

CHECK MASTER

Is so unusually sensitive that it responds to dimensional variations as fine as .000020"!

Use this versatile precision instrument in setting up work ON a surface and truing pieces IN machine tools. You'll find it superior in actual feature-by-feature comparison to any similar device in the industry. (See chart below)

COMPARATIVE ANALYSIS OF TEST INDICATORS

	STANDARD CHECK MASTER	Make A	Make B	Make C	Make D	Make E
Bearings Jeweled	ALL	Some	None	None	None	Some
Bearings Removable	ALL	Some	Some	None	ALL	ALL
Pivot Ends Covered	YES	YES	No	No	No	YES
Ratchet Contact Point	YES	YES	YES	No	YES	No
Contact Pressure (gr.)	15-15	23-33	23-33	23-23	45-49	28-38
Contact Pressure Equal in Both Directions	YES	No	No	YES	No	No
On-Center Mounting Vertical & Horizontal	YES	No	Vert. Only	No	Vert. Only	No
Absence of Reversing Lever	YES	No	No	YES	No	No
Total Weight (grams)	29	42	33	70	77	35
Hand Rotation Always Clockwise	YES	No	No	YES	No	No
.001" & .0001" Convertible	YES	No	No	No	No	No

Write today for complete information
Ask for CHECK MASTER Bulletin.

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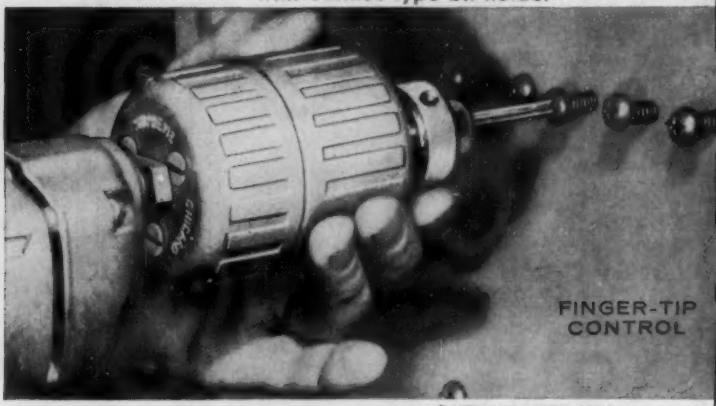
with Yankee-type bit holder



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ideas from readers

ideas from readers

Several time-saving ideas and suggestions for the man in the machine shop.

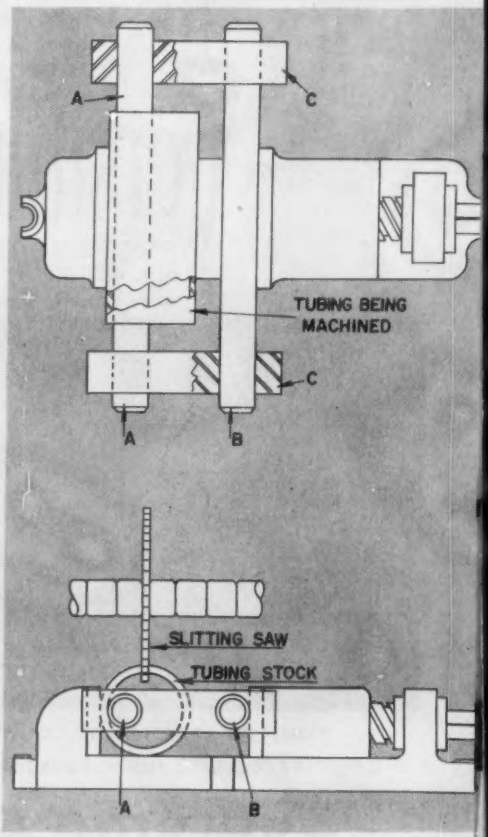
Simple Fixture for Holding Tubing in Miller Vise

By H. J. GERBER

Usually, it is difficult to hold tubing or pipe in a milling machine vise in order to slot it longitudinally for the reason that (1) the tubing is apt to be flattened and distorted by the squeezing action of the vise and (2) there is difficulty due to the tube closing up and binding the cutter. These difficulties can be avoided by the use of the simple fixture shown in the accompanying illustration.

This fixture consists of two pieces of round bar stock, *A* and *B*, which are held by the identical side pieces *C*. The two pieces *C* are made of flat cold rolled steel stock and are drilled and reamed together to provide a snug fit on the bars *A* and *B*. The distance apart of the two holes in each piece *C* depends upon the size of tubing or pipe involved.

When the fixture is assembled as illustrated, the pressure of the vise is transmitted directly through only one wall of the tubing to the permanent jaw of the vise and as much pressure can be applied to the work as needed without crushing the tube.



Sketch of simple fixture which is designed for holding tubing in a milling machine vise.

Method for Restoring Accuracy of a Self-Centering Lathe Chuck

By IRA S. ROBERTS

Sometimes universal lathe chucks lose their accuracy after repeated usage and require retruing of the jaws. In our shop, we make use of the fixture shown in Fig. 1 for this purpose and are consistently able to restore the accuracy of a chuck to less than 0.001 inch runout.

When internal grinding the jaw faces with a tool post grinder, as shown in Fig. 2, it is necessary to have the jaws tightened down in exactly the same manner as if a piece of work were being held in the chuck. This is accomplished by use of the four-ring holding fixture shown in Fig. 1, which securely grips the jaws against the inward closing pressure. It will be noticed that the three small rings are sawed open and ground off so that they will grip the angular edges of the jaw faces but will not interfere with the grinding wheel. If the fixture is secured near the outer ends of the jaws it will aid in the removal of any bellmouth as well as off-center condition.

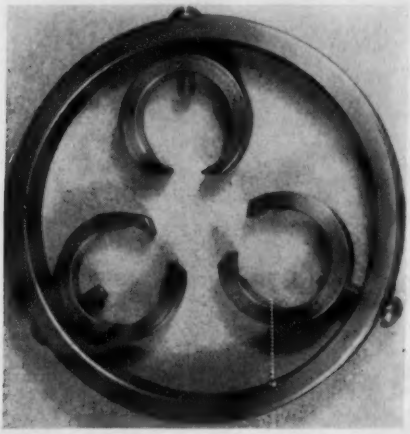


Fig. 1—Four-ring holding fixture for regrinding the jaws of a universal lathe chuck.

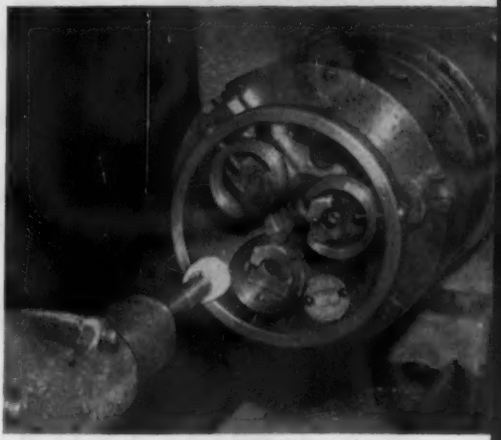


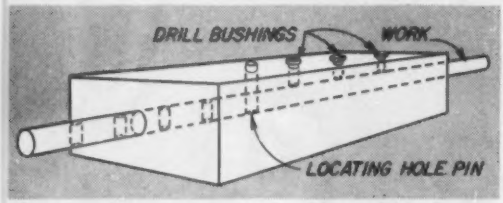
Fig. 2—Regrinding jaws of lathe chuck using four-ring holding fixture and toolpost grinder.

★ ★ ★

Simple Jig for Drilling Multiple Holes in Round Stock

By JOSEPH SAPRONI

The sketch herewith shows a simple drill jig for use in drilling rows of equally spaced holes in round stock. Easy to make, the jig consists of a piece of rectangular steel, which is bored out to a diameter sufficient to readily accommodate the work to be drilled. A locating hole and three bushing holes are drilled through the



Sketch of simple drill jig for use in drilling multiple holes in round workpieces.

top of the jig into the bored hole in same.

After the first hole is drilled in the workpiece, a drift pin is inserted in the locating hole so that the jig is firmly held in position while the next three holes are drilled in the workpiece. After these holes are drilled, the pin is removed and the jig is moved along the workpiece until the pin lines up with the last drilled hole, and the process is repeated.

If extra long rods are to be drilled, the jig can be made larger than necessary and a section of the jig cut off and used to firmly support the far end of the workpiece.

★ ★ ★

Unique Forming Die

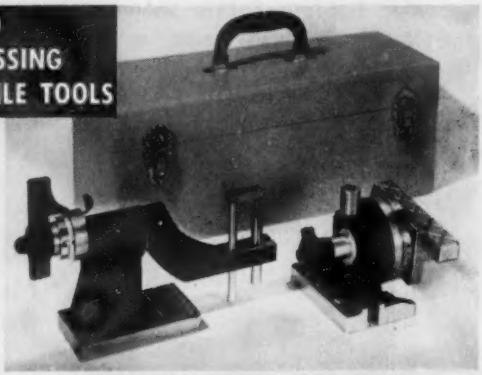
By F. C. ELMO

The accompanying drawing shows a unique forming die specially designed for use in forming a part with a hole therein, where the relationship between the hole and

Now ANGLE TANGENT TO RADIUS WHEEL DRESSING WITH NEW VERSATILE TOOLS

MIGHTY GOOD AT ANY PRICE
BUT TOPS AT ONLY $149.50
(Both tools including diamonds)

The G-5 RADIUS DRESSER is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on a 7 inch or 10 inch wheel, and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation. The G-2 ANGLE DRESSER AND TOOL HOLDER is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up small jobs to be milled, drilled, tapped, etc., on any desired angle.



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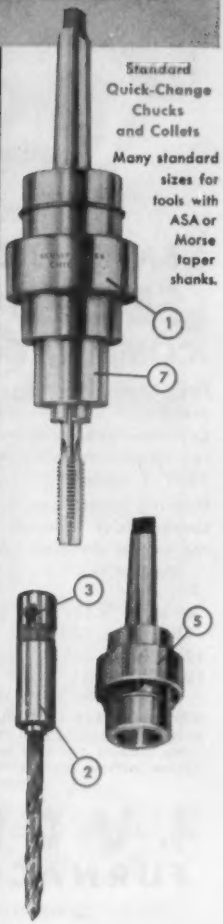
SCULLY-JONES QUICK-CHANGE CHUCKS AND COLLETS

ASSURE GREATER OVER-ALL ECONOMY FROM YOUR MACHINES AND CUTTING TOOLS

These benefits	..for these reasons	...result from these PREMIUM features
INCREASE PRODUCTION	Change tools fast without stopping the machine.	1. Operator merely lifts locking ring, without stopping machine, and the collet with cutting tool drops out.
		2. Operator inserts replacement collet in one easy motion. Ring falls into place by gravity, and machine is ready for next operation.
	Faster, easier ejection of cutting tools from collet	3. Exclusive keyhole-type drift slot permits ejection of tools by a simple twist of the wrist, using "Scully-Drift" or cam-type tool ejector.
REDUCE CAPITAL AND OPERATING COSTS	Minimize investment in special machinery.	4. Give multiple-spindle range to single-spindle machines used for sequence operations like drilling, counterboring, reaming, and tapping.
	Eliminate rejects	5. Locking ring holds collet firmly and securely in chuck, providing a positive drive to the two balls which are the driving mechanism.
	Reduce maintenance and replacement costs.	6. Chucks are heat-treated and ground to prevent distortion and "nicking."
ASSURE SAFE OPERATING CONDITIONS	Eliminate safety hazards.	7. No ears or sharp edges on locking ring, and ample projection of collet, eliminate possible injury to operator when changing tools in motion.



Standard Quick-Change Chucks and Collets

Many standard sizes for tools with ASA or Morse taper shanks.

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PRECISION HOLDING TOOLS

"Precision Holding" for holding precision

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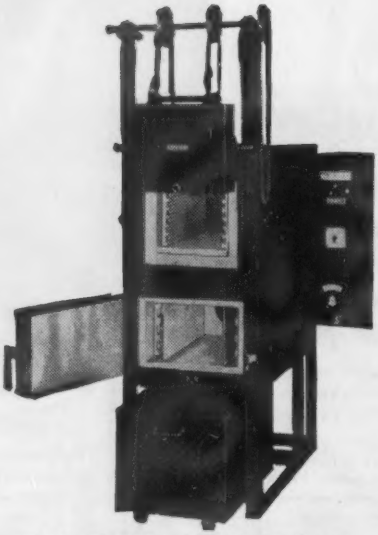

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Drawing furnace has a maximum of 800° F.* Quench tank included with the exception of the largest standard model.

Chamber Size H. W. L.	Prices 2000° F.	2300° F.
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9" x 9" x 18"	1150.00	1250.00
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* Also available up to 1250° F.

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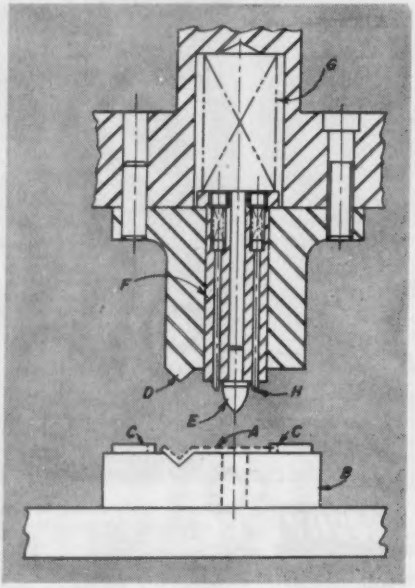
the form produced in the part must be accurately held.

To use the forming die, the part *A* is placed on the die block *B* between the nests *C*. When the forming punch *D* descends, the pilot *E*, which is mounted in a floating retainer, *F*, enters the hole in part *A*. The floating retainer *F*, which is actuated by means of a large spring, *G*, contacts the part and holds it firmly in place while the punch forms the end of the part as shown.

After the forming operation has been completed, the part is readily stripped off of the pilot by means of two spring-actuated ejector rods, *H*.



Drawing of unique forming die designed for use in forming part with hole therein.

Greatest thing that's happened since the Madison Boring Tool!

Madison-Faessler Roller-Burnishing Tool

- ***Superior Surface Finish*** — five micro-inches or better.
- ***Single Pass Operation*** — for roller-finishing bores of any length.
- ***Fast, Easy to Set Up*** — on conventional shop machines.
- ***Adjustable in Size*** — for easy-to-handle job changes.
- ***Off-the-Shelf Delivery*** — of standard tools in most popular sizes.
- ***Extra Long Life*** — thousands of passes before parts replacement.

If you'd like to know more about this fabulous tool, or our roller-burnishing tools for O.D. cylindrical surfaces as well as tapers and radii, just send coupon today.

Let the man with the holes in his head tell you how to cut costs in:

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- ★ **Roller-Burnishing**
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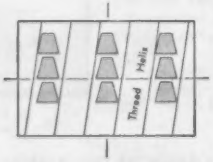
BARBER-COLMAN offers

thread milling requires accurate cutter design!

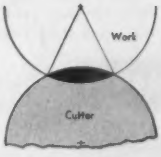
mathematical computation of cutter form

Multiple thread milling cutters often produce a thread space form which is not a duplicate of the cutter tooth form. The cutter tooth form is not a duplicate because the cutter tooth rotates in a plane which is perpendicular to the work axis and at an angle to the thread helix. This generating action produces a fillet at the bottom of the threads, and a thread space which is wider than the cutter tooth. When the amount of generating produces an unsatisfactory thread form, the cutter must be developed to produce the desired thread tooth thickness without fillet interference.

Whenever required, Barber-Colman engineers, by mathematical computation, design the correct cutter which compensates for the generating action. In this computation, the diameter of the cutter is very important since the amount of tooth form correction increases as the diameter of the cutter increases. A thread produced by a specially-developed cutter will have an accurate form which will fit the gage with the desired bearing.



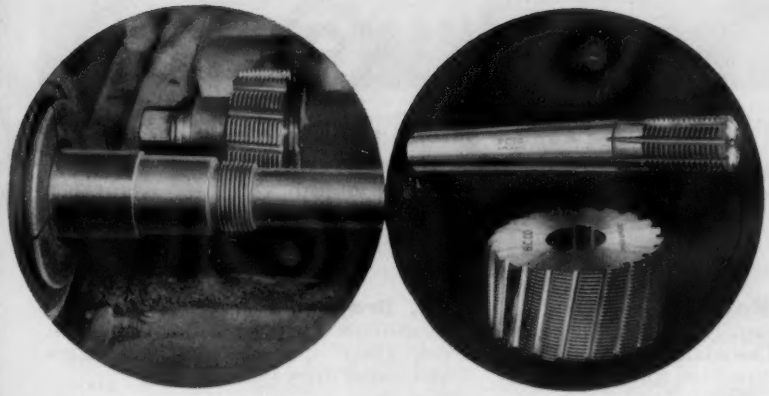
This schematic drawing shows how a multiple thread milling cutter produces a thread space which is wider than the cutter tooth. The cutter is set so that the plane of rotation of the cutter teeth is perpendicular to the work axis, and at an angle to the thread helix.



Large diameter cutters have greater length of contact and produce more pronounced fillets.

Small diameter cutters have less length of contact and produce smaller fillets.

In some cases, cutters mill deeper than true thread form. Any generated fillets which may be cut are then below the gaging surface of the thread. Correct cutter design takes care of this automatically.



original cutter accuracy in resharpening

All Barber-Colman form-relieved milling cutters are accurately index-sharpened on Barber-Colman automatic sharpening machines, so that all cutter teeth are the same height and accurately spaced. This makes it easy to maintain original cutter accuracy when resharpening either on automatic sharpeners, or on conventional sharpening equipment using the accurately indexed cutter teeth as a reference. In either case, accurate sharpening to original tolerances is easily maintained, and cutter sharpening time is reduced to a minimum.

design elements for maximum performance

With the proper tooth form developed to cut accurate threads, the engineers then analyze the job conditions to determine which cutter features will produce best cutter performance. These features include selection of the proper cutter material, shell or shank type cutters, straight or helical flutes, rake teeth, axial relief and intermittent teeth if sharp threads are desired. Since we make all classes of ground and unground thread milling cutters, we can recommend the cutter accuracy required for your job.

When you have a threading problem, consult Barber-Colman cutter engineers for their recommendations on the proper cutters for the job. Be sure the cutters you have are accurately designed to cut the correct thread form. Send us blueprints of your threaded parts for quotation on thread milling cutters designed to produce correct threads.

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10. Draw Formers
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11. Grinding Technique
Bay State Abrasive Products Co., Westboro, Mass. Booklet entitled "Electronic Formulation."

12. Toolholders
Besly-Welles Corp., 108 Dearborn Ave., S. Beloit, Ill. Complete line of toolholders and triangular and square throwaway carbide inserts.

13. Protective Coatings
Bischoff Chemical Corp., 105 Main St., Ivoryton, Conn. Thermo-Cote strippable protective coatings.

14. Ovens
Blue M Electric Co., 138th & Chatham St., Blue Island, Ill. Power-O-Matic mechanical convection ovens feature automatic wattage control.

15. Diameter Gages
Boice Gages, Inc., Staatsburg, N. Y. Extensive line of indicator gages.

16. T-Slot Bolts
Boyar-Schultz Corp., 2020 S. 25th Ave., Dept. F-B, Broadview, Ill. Precision-made alloy steel T-slot bolts.

17. Pedestal Drill
Buffalo Forge Co., 388 Broadway, Buffalo, N. Y. No. 16 pedestal drill with a 12 inch overhang and a power feed.

18. Marking Tool
Burgess Vibrocrafters, Inc., Dept. A-54, Grayslake, Ill. Electric Vibro-Graver that writes like a pencil on hardest steel.

19. Screw Machine Products
Chicago Screw Co., 2803 Washington Blvd., Bellwood, Ill. Complete services for the design, development and manufacture of screw machine products and cold upset parts.

20. Carbide Tools
Chicago-Latrobe, 419 W. Ontario St., Chicago 10, Ill. Complete line of carbide tools.

21. Grinding Machines
The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. Automatic balancing feature for Cincinnati Filmatic plain, roll and centerless type grinding machines.

22. Handling Systems
The Cleveland Crane & Engineering Co., Cleveland Tramrail Division, Wickliffe, Ohio. Overhead materials handling systems.

23. Granite Surface Plates
Collins Microflat Co., 2326 E. Eighth St., Los Angeles 21, Calif. Microflat black granite surface plates and precision inspection accessories.

24. Broaching Machines
Colonial Broach & Machine Co., P.O. Box 37, Harper Station, Detroit 13, Mich. ElectroGear line of horizontal surface broaching machines.

25. Lubrication Supplies
Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago 50, Ill. Die set lubrication supplies.

26. Pneumatic Cylinders
Dayton Rogers Manufacturing Co., Minneapolis 7D, Minn. Model "L" pneumatic counterbalance cylinders for punch presses and power brakes.

27. Toggle Clamps
Detroit Stamping Co., 349 Midland Ave., Detroit 3, Mich. Toggle clamps for split-second clamping in modern production operations.

28. Loose Diamonds
Diamond Tool Research Co., Inc., 380 Second Ave., New York 10, N. Y. Standard categories in addition to detailed information concerning loose industrial diamonds.

29. Quality Control Gages
The Dow Mechanical Corp., Thompsonville, Conn. Dow-Gage and Tacomp, when tooled, are comparators and are used for comparing dimensions on manufactured parts to a master or approved part.

30. Measuring Machine
Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill. Internal measuring machine which is capable of measuring the diameters of cylindrical reference ring gauges.

31. Automatic Lathe
Gisholt Machine Co., Madison 10, Wis. Masterline Simplimatic automatic type lathe.

32. Screw Machine Tools
Hamilton Manufacturing Co., Inc., 286 Hamilton St., New Haven, Conn. Barnaby screw machine and line of turret lathe tools.

33. Electrical Products
Holub Industries, Inc., Sycamore, Ill. More than 400 items in the "Hi" line of electrical and mechanical products and equipment.

34. Shaping Machine
Jersey Manufacturing Co., 401-C Livingston St., Elizabeth, N. J. Form and punch shaping machine to be used for producing contours of all descriptions, surfaces and punches with curved necks.

35. Heat Treating Furnaces
Johnson Gas Appliance Co., 571 E. Ave., N.W., Cedar Rapids, Iowa. Furnaces, burners, valves, torches, mixers, blowers, stock tank heaters, controls and so on.

36. Heating Equipment
Lepel High Frequency Laboratories, Inc., 55th St. and 37th Ave., Woodside 77, New York City, N. Y. High frequency induction heating equipment.

37. Furnace Accessories
Lindberg Engineering Co., Lindberg-Fisher Division, 2469 W. Hubbard St., Chicago 12, Ill. Complete line of auxiliary items used in conjunction with melting furnaces in the foundry.

38. Liquid Chillers
Lundholm Manufacturing Co., 1121 Charles St., Rockford, Ill. Liquid coolant chillers are automatic, compact, self-contained and dual controlled.

39. Hydraulic Cylinders
Lynair, Inc., 3100 E. Michigan Ave., Jackson, Mich. Square type, steel head hydraulic cylinders which feature tie-rod construction.

40. Safety Guides
The McGonegal Manufacturing Co., E. Rutherford, N. J. Themac drill press safety guides.

41. Rotary Finisher
Mathewson Machine Works, Inc., 80 Hancock St., Quincy 71, Mass. Rotary finisher and buffer equipped with disc attachment.

42. Identification Tags
Jas. H. Matthews & Co., 3944 Forbes St., Pittsburgh 13, Pa. Metal checks, tags, plates, signs, badges and similar products for identifying items of all descriptions.

43. Cutting Tools
Metal Carbides Corp., Youngstown 12, Ohio. Aluminum oxide cutting metals, tool tips, throw-away inserts, cylinders and other turning and cutting tools.

44. T-Nut and Stud Sets
Montgomery & Co., Inc., 53 Park Pl., New York City 7, N. Y. T-nut and stud sets and step block sets.

45. Boring Tools
Moore Special Tool Co., Inc., 730 Union Ave., Bridgeport 7, Conn. Complete line of boring tools to be used for production or in the toolroom.

46. Cutting Tools and Dies
J. I. Morris Co., 394 Elm St., Southbridge, Mass. Miniature taps, dies, screws, drills and tools.

47. Walkie Trucks
The Moto-Truc Co., 1959 E. 59th St., Cleveland 3, Ohio. Complete line of electric powered walkie trucks.

48. Carbide Tools
Nelco Tool Co., Inc., Manchester, Conn. Large selection of carbide and carbide tipped tools.

49. Safety
Norton Co., Worcester 6, Mass. Protective equipment, machine guards, signs, safety rules, safety glasses, use of ladders, safety shoes, electric truck operation, fires, use of hand rails, plant housekeeping and so on.

50. Optical Comparator
Opto-Metric Tools, Inc., 137 Varick St., New York 13, N. Y. Wilder Micro-Projector, Model A.

51. Radiation Gage
Pratt & Whitney Co., Inc., 25 Charter Oak Blvd., W. Hartford 1, Conn. Rad-I-Acc continuous non-contacting radiation gage.

52. Jig Grinder
Production Machinery Development Co., 4847 St. Aubin, Detroit 7, Mich. Jocar "JG" jig grinding unit.

53. Thread Rolls and Holders
Reed Rolled Thread Die Co., Worcester 1, Mass. Standardized thread rolls and holders for single roll applications.

54. Air Cylinders
The S-P Manufacturing Corp., 30201 Aurora Rd., Solon, Ohio. Series A standard non-rotating air cylinders, valves and accessories.

55. Paper Towels
Scott Paper Co., Chester, Pa. High absorbency Scott paper towels.

NEW GUIDE to modern production metal MARKING

BACKED BY
50 Years Experience
AS MASTERS OF METAL MARKING

For half a century NOBLEWEST has been solving industry's marking problems . . . designing and building equipment for faster, better, *permanent* marking of metal products at lower cost. Our new catalog contains the complete line of NOBLEWEST Marking Machines and Marking Tools including many new developments in better marking. For your copy, just send us your name and title on your company letterhead. Noble & Westbrook Manufacturing Co., 25 Westbrook Street, East Hartford, Conn.

NOBLEWEST 50TH ANNIVERSARY

MARK IT BEST WITH

NOBLEWEST

For more data circle 318 on Reader Service Card

56. Industrial Service Tools
Snap-on Tools Corp., Kenosha, Wis. Chests, cabs, wrenches, sockets, screwdrivers, pliers, pulling equipment, tool assortments and so on.

57. Toolroom Lathe
South Bend Lathe Works, South Bend 22, Ind. Sixteen inch toolroom and engine lathes feature five bed lengths, 33 to 105 inches between centers.

58. Spindles
The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio. Super precision spindles for grinding, boring, drilling, milling, routing and so on.

59. Aircraft Fasteners
Standard Pressed Steel Co., Box 556, Jenkintown 22, Pa. High strength steel aircraft bolts, designated as Hi Psi EWB-22, and EWN-22 locknuts.

60. Measuring Tools
The L. S. Starrett Co., Athol, Mass. Mechanics hand measuring tools and precision instruments, steel tapes, steel rules, dial indicators and dial gages, hacksaws, hole saws, band saws, precision ground die and flat stock.

61. Bearing Grease
Sun Oil Co., Philadelphia 3, Pa. N-52X—a stable, high-melt-point grease for bearings running at temperatures up to 250 degrees F.

62. Speed Reducer
Supreme Products Corp., 2222 S. Calumet, Chicago, Ill. Versamatic Professional Model No. 4000-P reversible speed reducer with Yankee bit holder.

63. Testing Sets
Taber Instrument Corp., 111 Goundry St., N. Tonawanda, N. Y. Standard abrasion testing set, Model 174.

64. Electric Furnaces
Thermo Electric Manufacturing Co., 488 Huff St., Dubuque, Iowa. Electric furnaces and temperature controllers.

65. Taps
Threadwell Tap & Die Co., Greenfield, Mass. Basic information on taps, their uses and description.

66. Dust Collection
Torit Manufacturing Co., 296 Walnut St., St. Paul 2, Minn. "You Can Solve That Dusty Cost Problem."

67. Test Equipment
Trop-Arctic, Inc., 627 S. Mulberry St., Muncie, Ind. Environmental test equipment and ultra low temperature equipment for shops and plants.

68. Dye Penetrant
Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif. Dy-Chek—the dye penetrant flaw location method.

69. Air Presses
Van Products Co., 5700 Old Ridge Rd., Erie 7, Pa. Bench-type air presses and air arbor presses.

70. Milling Cutters
The Viking Tool Co., P.O. Box 471, Shelton, Conn. Inserted blade type milling cutters.

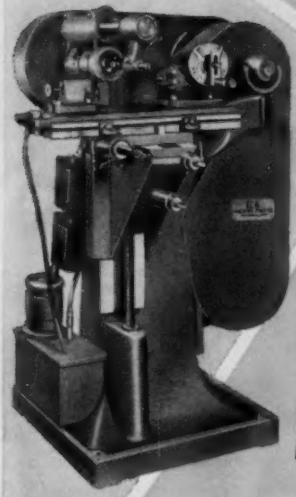
71. Temperature Cabinets
Webber Engineering Corp., P.O. Box 217, Indianapolis, Ind. Sub-zero temperature cabinets with front or top opening have 2 cu. ft. capacity.

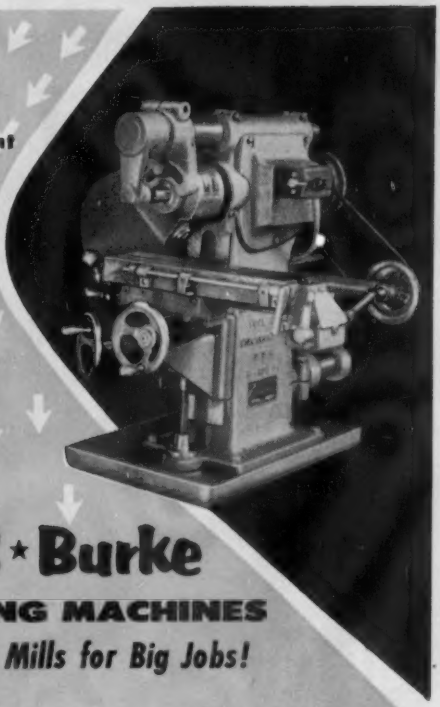
72. Perforating Dies
S. B. Whistler & Sons, Inc., 740 Military Rd., Buffalo 23, N. Y. Adjustable perforating dies for perforating materials up to ⅛ inch mild steel.

73. Machine and Hand Tools
Whitney Metal Tool Co., 720 Forbes St., Rockford, Ill. Punches, shears, presses, brakes and small tools.

74. Turret Punch Presses
Wiedemann Machine Co., Dept. 339, 4219 Wissahickon Ave., Philadelphia 32, Pa. Interesting booklet entitled "How to Cure Piercing Headaches."

Small parts bottlenecks strangling your milling department ?





U·S·Burke

MILLING MACHINES

Free Big Mills for Big Jobs!

No. 1 U. S. MILLING MACHINE

The top-quality, precision mill, economically priced! Hand operation, or air-hydraulic feed for high production.

Accurate and simple-to-operate, brings small part production into balance, avoids wasted time and investment in big mills.

Excellent for keyways, quantity runs of sectors, short racks, simple profiling, sawing, slotting, squaring, cut-off, short-run splining, even light slab milling.

BURKE BENCH MILLERS

Small part milling accuracy for toolroom or production uses . . . 2 hand and 2 power feed models.

Rugged frame, hand scraped thruout, Timken bearings . . . time-tested design for accurate milling, drilling, sawing, boring, facing and slotting of small parts.

Wide range of speeds. Dependable performance and ease of set-up lower operational costs. Vertical Milling Attachment and complete range of other accessories.

Write for complete specifications and prices

U·S·Burke MACHINE TOOL DIVISION
3 Brotherton Road • Cincinnati 27, Ohio

Manufacturers of the U. S. Vertical Milling Machine and the radically new U. S. Quartet

For more data circle **319** on Reader Service Card

at rates up to 288 per hour

Five Burr-Blast models available — manually loaded stationary or continuous rotating units and fully automatic in-line types—permit you to pick the right type and size machine to remove fragmentary burrs from finish machined non-ferrous or cast iron parts. Simple installation uses normal plant air supply from 60 to 80 psi. Built-in flexibility permits burring a variety of parts on any of the Burr-Blast models.

You also benefit from Modern's experience in successfully blast burring a wide range of part shapes and sizes with every known blasting material including: walnut shells, silicon carbide, steel shot, etc.

Ask for literature describing Modern's Burr-Blast line.

14230 BIRWOOD AVE. **MODERN®** DETROIT 38, MICHIGAN

Industrial Engineering Co.

For more data circle **320** on Reader Service Card

This Cincinnati Bickford Super Service Radial Drill effects substantial cost savings in general applications. Drilling, tapping and setting fifty 1½" diameter studs on this turbo casing, shown above, is done in 185 minutes now as against 242 previously.

The York Corporation tells us that simplified, centralized controls, ease of machine positioning and minimum operator fatigue are important factors in these cost savings.

Write for bulletin covering these Cincinnati Bickford Super Service Radials.

Illustration courtesy of the York Corporation, York, Pa.

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

CINCINNATI BICKFORD DIVISION
GIDDINGS & LEWIS MACHINE TOOL COMPANY
OAKLEY, CINCINNATI 9, OHIO, U.S.A.

For more data circle 321 on Reader Service Card

New plants and expansions . . . meetings . . . obituaries . . . new appointments.

BROWN AND SHARPE ANNOUNCES NEW CUSTOMER ORDER FILLING SYSTEM

The Brown and Sharpe Manufacturing Co., Providence 1, R. I., has announced the installation of a new system in its stock and shipping rooms, whereby the time required to fill customer orders is materially reduced. In the layout of the new stock room, goods, as they are picked from the shelves paralleling a conveyor, are immediately placed on this constantly moving belt which runs through the entire department and ties together the stock room

View of the new Brown and Sharpe stock room, showing a portion of the 600-foot long conveyor belt that is used to move orders quickly through the department.

and shipping areas of the department.

The belt itself is striped down the middle and a switch plate at the shipping room end automatically deflects the items which have been placed on one side of the stripe into the parcel post packing line, and those on the other side of the stripe into the consolidation station—and then on to the freight and express packers. As the order passes the shipping clerks' stations, the goods are slid off the conveyor, wrapped, strapped or sealed and then placed back on the belt to wind up at the postage meter and scales, or at the freight strapping machine and heavy-duty scales.

★ ★ ★

SHEFFIELD CREATES NEW DIVISION

In order to help industry cope more efficiently and economically with the mounting precision measurement and control problems posed by the automation age, The Sheffield Corp., Dayton, Ohio, recently established a research and development division devoted exclusively to instruments, controls, machines and systems for "autometrology."

According to a company official, Sheffield is now devoting a major portion of its annual research and development budget to systems for "autometrology," which the company defines as "the single or multiple combination of machining, motion or memory with automatic "measurement." In simpler terms, from the word "autometrology," "auto" means automatic and "metrology" signifies measurement.

***Be Sure* with a Matched-to-the Machine**

STEARNS MAGNETIC CLUTCH

On many machines a *standard* magnetic clutch or clutch brake does the job. Others require a *special custom-made* unit for most profitable results. Stearns provides *both* with these big advantages:

- Torque range from .4 to 30,000 lb. ft.
- Low inertia — fast, smooth engage and disengage. Split shaft, through shaft, two speed drives, forward and reversing drives — other special applications.
- Quiet and cool running. No metal-to-metal contact, no sparking.
- Automatic or manual control.
- Simple adjustment — no toggles, yokes, shifters.

Write for new literature on Stearns magnetic clutch and clutch brakes. 1054

Stearns ELECTRIC CORPORATION

formerly STEARNS MAGNETIC INC.

120 NORTH BROADWAY • MILWAUKEE 2, WISCONSIN

For more data circle 322 on Reader Service Card

The new Autometrology Division is planned to mobilize a staff of several hundred Sheffield gaging instrument, hydraulics, electronic, pneumatic, nucleonic and other specialized engineers. The Autometrology Division of The Sheffield Corporation is to be under the direction of W. Fay Aller.

JOSEPH W. C. BULLARD, SR.

Joseph W. C. Bullard, Sr., retired vice president and member of the board of directors of The Bullard Co., Bridgeport, Conn., died recently at the age of 74. Mr. Bullard was the last survivor among five sons of Edward Payson Bullard, Sr.—founder of The Bullard Company—all of whom devoted their lives to the development of the company.

At the time of his retirement from The Bullard Company in 1947, Mr. Bullard was vice president in charge of research.

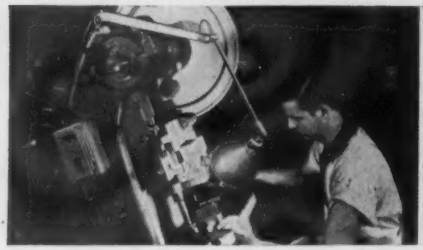
After his retirement, he formed a new company known as J. W. Bullard and Sons, Inc., a separate machine company located in Fairfield, Connecticut. His son, Joseph W. C., Jr., is president, and another son, Robinson D., is vice president, secretary and treasurer. Mr. Bullard served as vice president.

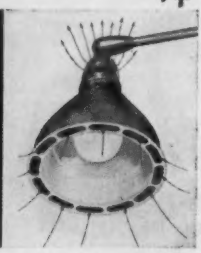
J. W. C. Bullard, Sr.

Air-Cooled **Lighting by Dazor at Low Cost**

Choice of Arm Extensions: 31″ (No. 1100) 20″ (No. 1101) Same Price

Adjustable-Arm Models





Light up machines and benches at rock-bottom cost and get Dazor dependability besides. New Adjustable-Arm Lamps mount solidly, hold fast in any position set. Either top- or side-mounted reflector. Air-cooled housing is safe to handle despite continuous use. Gray baked enamel over bonderizing. Call your Dazor distributor. Dazor Manufacturing Corp., St. Louis 10, Missouri.

...Makers of

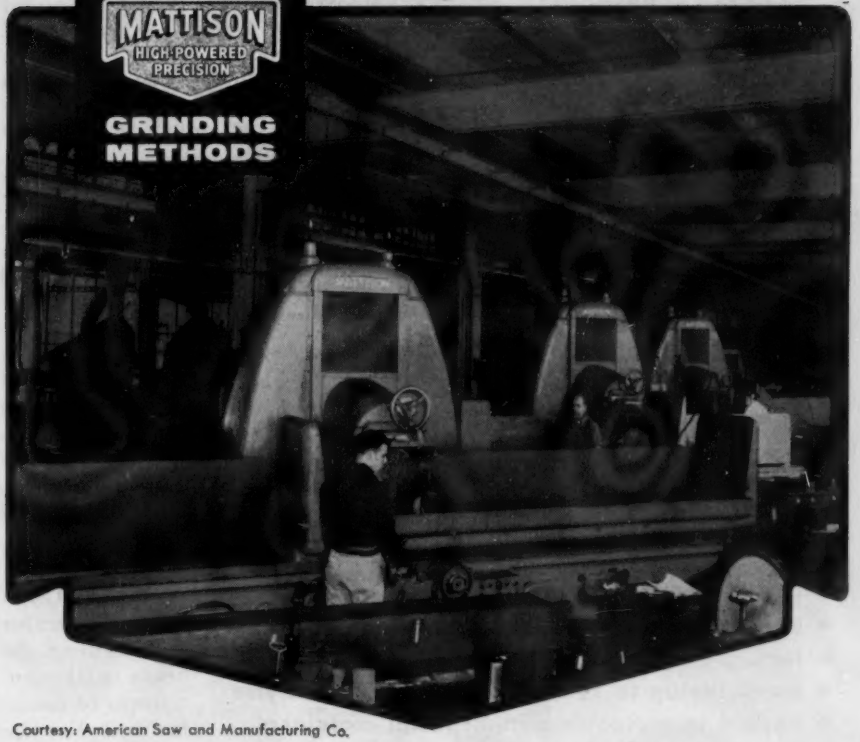
DAZOR FLOATING LAMPS

For more data circle 323 on Reader Service Card

Case History No. 29—Precision-Ground Flat Stock

MATTISON
HIGH-POWERED PRECISION

GRINDING METHODS



Courtesy: American Saw and Manufacturing Co.

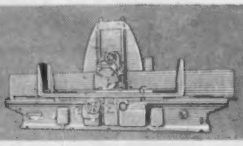
Battery of five Mattison surface grinders speeds production of precision-ground tool steel

American Saw and Manufacturing Co., of East Longmeadow, Mass., uses a battery of five Mattison High-Power Precision Surface Grinders to grind annealed tool steel ground flat stock on a high-production basis. This precision product is used to make fixtures, templates, gauges, etc., and consistent quality means sizable savings for tool makers. American produces fine finish stock on which thickness is held to within .001 in.

Mattison has designed the High-Power Precision Surface Grinder with the ability to hog off stock, where required, and still maintain precision and fine finish. An outstanding feature of these machines is the massive, double-column support which is assembled as an integral part of the base. See your Mattison machinery dealer about putting the *"power-designed"* machine to work cutting costs and upgrading quality in your shop!

MATTISON
MACHINE WORKS
ROCKFORD ILL. U.S.A.

High-Powered Precision Surface Grinders
MATTISON MACHINE WORKS
Rockford, Illinois, U. S. A.



For more data circle **324** on Reader Service Card

news of the industry . . .

JONES AND LAMSON ACQUIRES MODERN TOOL

Jones and Lamson Machine Co., Springfield, Vermont, recently acquired the physical inventory, work in process, trade names, design and customer good-will of the Modern Tool Works, located in Rochester, New York.

Modern Tool Works was founded shortly before World War I, purchased by the Consolidated Machine Tool Corporation in the 1920's and, three years ago, became a division of Farrel-Birmingham Co., Inc., which is located in Ansonia, Connecticut.

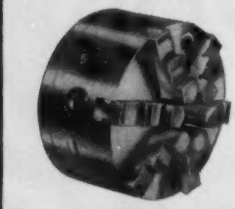
Jones and Lamson plans to integrate the new line with its existing line of tools in the Thread Tool Division. The company feels that this new line will blend very well with present manufacturing, engineering and marketing facilities of that division. The new line will consist of collapsible taps and chasers, solid adjustable taps and chasers, the Modern Magic Chuck and Stud Setter. Chasers for the Modern die heads will continue to be manufactured by the company for those customers who still have these die heads.

★ ★ ★

NORTON CREATES NEW DIVISION

The Norton Co., Worcester, Mass., recently created three new divisions in a reorganization program. The three

compare HORTON Tru-Set FEATURES



- Repetitive accuracy to .0002" T.I.R. guaranteed
- Rugged Meehanite bodies guaranteed for life
- Instant peripheral location – 3 operating pinions
- Available up to 12" in both 3 and 6 jaw styles
- Packed in reuseable airtight metal containers

compare HORTON Tru-Set PRICES

SIZE	MODEL	NET PRICE
5	5T6	86.35
6	6T6	120.65
8	8T6	167.65
10	10T6	247.65
12	12T6	298.45

Chucks listed above are 6 jaw universal type with two sets of jaws. See your Horton Distributor or write direct for new Net Price Selector

HORTON CHUCK

WINDSOR LOCKS, CONN.

For more data circle 325 on Reader Service Card

"Tumblex* 'T' has a definite place in our tumbling department"...

That's the report from a leading pump manufacturer — when the new Norton bonded, triangular-shaped abrasive, gave results like these:

100% increase in barrel payload and 80% reduction in tumbling time. A sandblast operation eliminated and hand deburring reduced about 75%.

The uniform triangular shape and size of Tumblex "T" abrasive prevents wedging in recesses . . . Made of famous bonded ALUNDUM* abrasive, it cuts fast, with no cutting compound needed . . . It provides maximum surface contact with parts being processed, for shorter cycles and larger payloads . . . It wears evenly, and when worn down can be used on parts requiring a smaller abrasive . . . Its lightness means less weight required to fill the barrel.

Send your work samples to our Sample Processing Department. Let us prove how the latest barrel finishing equipment and techniques can add the "Touch of Gold" that improves your product quality and cuts finishing time and costs. NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

G-316

NORTON

ABRASIVES

Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories

BEHR-MANNING PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes

*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

For more data circle 326 on Reader Service Card

new divisions are the Abrasive Division, headed by John Jeppson as vice president and general manager; the Refractories Division with William G. Fallon as general manager; and the Electro-Chemical Division, headed by Howard J. Daly as vice president and general manager.

This brings the number of divisions within the company to six. The others, which are not affected by the change, are the Grinding Machine Division, Behr-Manning Division (located at Troy, N. Y.) and Norton Behr-Manning Overseas, Inc., which handles export sales and operation of overseas plants.

Although the terms "abrasive division" and "refractories division" have been used loosely within the company for many years, this is the first time they have been organized along true divisional lines each with a general manager.

★ ★ ★

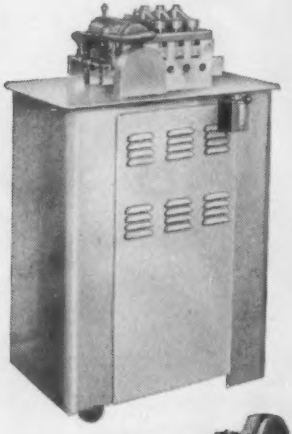
TORRINGTON HOLDS MEETING

At the annual meeting held recently, the director of The Torrington Co., Torrington, Conn., re-elected the following officers: Walter C. Thompson, president; Milton E. Berglund, executive vice president; Floyd A. Pearce, vice president — finance, and treasurer; Lawrence W. Smith, vice president — manufacturing; Byron T. Virtue, vice president — engineering; Edward B. Thompson, vice president — sales; W. Weston Blelock, secretary; William R.

Economy • Dependability

WITTEK

STOCK STRAIGHTENERS



Used in conjunction with a reel stand and automatic feed for punch presses, the Wittek Stock Straightener is a self-contained, motor-driven unit designed for maximum efficiency in the continuous straightening of coiled stock. Standard models handle stock with widths up to 12 inches. An infinitely variable speed drive permits any desired straightening speed so that the proper slack is maintained in the straightened strip between the unit and the press feed.

This typical Wittek automatic production feeding setup includes —Wittek roll feed mounted on the punch press, Wittek stock straightener, and Wittek self-centering reel stand.

5577

Write for full particulars

WITTEK Manufacturing Co.

4322 W. 24th Place • Chicago 23, Illinois

Production Feeding Equipment

For more data circle 327 on Reader Service Card

HEAVY-DUTY AIR (or Oil) CLAMPS

Never send a boy
TO DO A MAN'S JOB

Design with clamps rated to the job they must do. Knu-vise heavy-duty clamps possess the extra margin of life needed because they're rugged, strong, built to stand abuse.

Knu-vise heavy-duty clamps are air (or oil) and hand operated—have either solid or channel bars. Featured are:

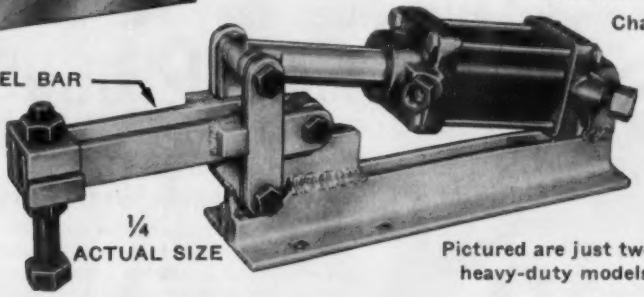
1. **Hardened and ground bearing bolts**
2. **Self-locking nuts for minute adjustment of parts**
3. **Toggle bars from C.R.S. bars**
4. **Easy and complete replaceability of parts**

SOLID BAR

MODEL AOS-400 (HD)—Solid Bar

MODEL AO-400 (HD)
Channel Bar

CHANNEL BAR



¼ ACTUAL SIZE

Pictured are just two of several heavy-duty models available.

In a high production automobile plant, a Lapeer installation lasted for more than 1,300,000 cycles. After a small repair, the installation has passed the 2,000,000 mark and is still going strong. Better write today for complete information. No obligation, of course.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS **LAPEER MANUFACTURING CO.**

3048 DAVISON ROAD • LAPEER, MICHIGAN

WESTERN DIVISION: 422 Magnolia, Glendale, California • CANADIAN DIVISION: Higginson Engr., Hamilton, Ontario

For more data circle **328** on Reader Service Card

Reid, Jr., assistant secretary; Ray E. White, assistant treasurer; Walter Hudson, assistant treasurer; and Josiah H. Drummond, clerk.

The company's annual meeting of stockholders was held in Portland, Maine. At that time, the following directors were elected: Milton E. Berglund, Frederick L. Braman, John A. Coe, Lewis A. Dibble, Rodney T. Dunlap, Ostrom Enders, Theophil H. Mueller, Floyd A. Peters and Walter C. Thompson.

Mr. Enders, president and director of the Hartford National Bank and Trust Company, was elected to fill the vacancy caused by the death of Joseph B. Ely, former Governor of Massachusetts.

Rodney Dunlap, vice president and general manager of the South Bend, Indiana, subsidiary; namely, The Torrington Company, Inc.; was elected to fill the vacancy caused by the retirement of N. Russell Clarke.

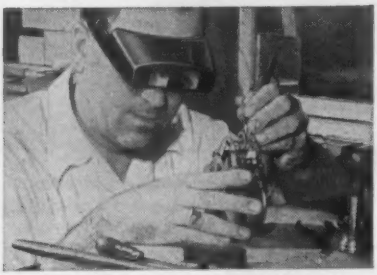
★ ★ ★

FARREL-BIRMINGHAM TRANSFERS ROLLER GRINDER DIVISION

Farrel-Birmingham Co., Inc., has announced the transfer of its roll grinder sales and service from Ansonia, Connecticut to Consolidated Machine Tool Division of Farrel-Birmingham Co., Rochester 10, N. Y. The work of this division will be handled by the same staff, under the direction of Harlan J. Hauser, manager of roll grinder sales. Mr. Hauser will also assume the duties of administrative assistant to Roger E. Vaughn, assistant general manager of the Rochester, N. Y., plant.

★ ★ ★ ★ ★

People work better when they SEE BETTER®



In the General Electric Plant
Magni-Focuser helps a worker make adjustments on precision equipment.

MAGNI-FOCUSER's matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

MAGNI-FOCUSER

SPEEDS PRODUCTION
With Third Dimensional (3-D) Vision
Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and *prevents squinting*—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.
Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.
Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. $10.50.

Send for descriptive folder

EDROY PRODUCTS CO. 480 Lexington Ave., Dept. P, New York 17, N. Y.

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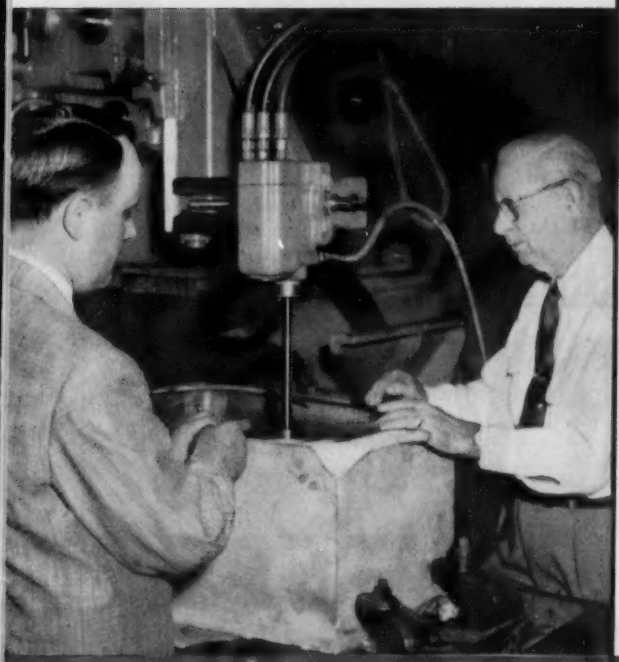
STANOIL *Industrial Oil*
tough performer in delicate operation



A. T. Wallace (right), President of Wallace Tool and Die Company, and Standard Oil lubrication specialist, H. A. Peterson, check sensitivity of new Cincinnati Hydro-Tel Milling Machine which uses STANOIL as hydraulic medium. Howard Peterson has been providing technical service to customers since joining Standard Oil. He is a graduate of General Motors Institute. Howard's customers find this experience pays off for them.

Delicate operations with metal requiring almost a surgeon's skill are every day stuff to Wallace Tool and Die Company, Indianapolis. Recently, they purchased a Cincinnati Hydro-Tel Milling Machine for their highest precision work. They selected STANOIL Industrial Oil for the hydraulic medium. The reason for choosing STANOIL: they wanted a hydraulic fluid that could deliver high performance. They wanted a clean hydraulic system, free of deposits that might clog filters and interrupt operations. They wanted smooth operation without pump chatter and without foam. They got these with STANOIL.

How did Wallace Tool and Die come to choose STANOIL? The answer is not hard to find. They had used STANOIL for hydraulic systems throughout their plant for many years. It has given them the results they wanted so it was natural to pick STANOIL for their new Cincinnati machine.

With STANOIL the machine performs the delicate operation of contour tracing with only 3½ ounces of pressure needed to control the milling cutters. STANOIL gives them smooth, steady, uninterrupted performance.

STANOIL can serve you. In the Midwest a lubrication specialist at your nearby Standard Oil office will be glad to show you. Call him. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY (Indiana)

Wash drawing showing the new factory addition for American Drilling Bushing Company.

AMERICAN DRILL BUSHING EXPANDS

American Drill Bushing Company is in the process of completing an addition to its factory located at 5107 Pacific Blvd., Los Angeles, Calif. According to company officials, the new building, situated on one acre of land, will accommodate private, general and executive offices, factory and parking area which will double the output of drill jig bushing production.

Perforated steel panels decorate the front of the modern structure to harmonize with the main building design.

MARVECO
LIVE CENTERS
• Highest Precision
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ASK YOUR DISTRIBUTOR OR WRITE
MARVEL TOOL & MACHINE CO.
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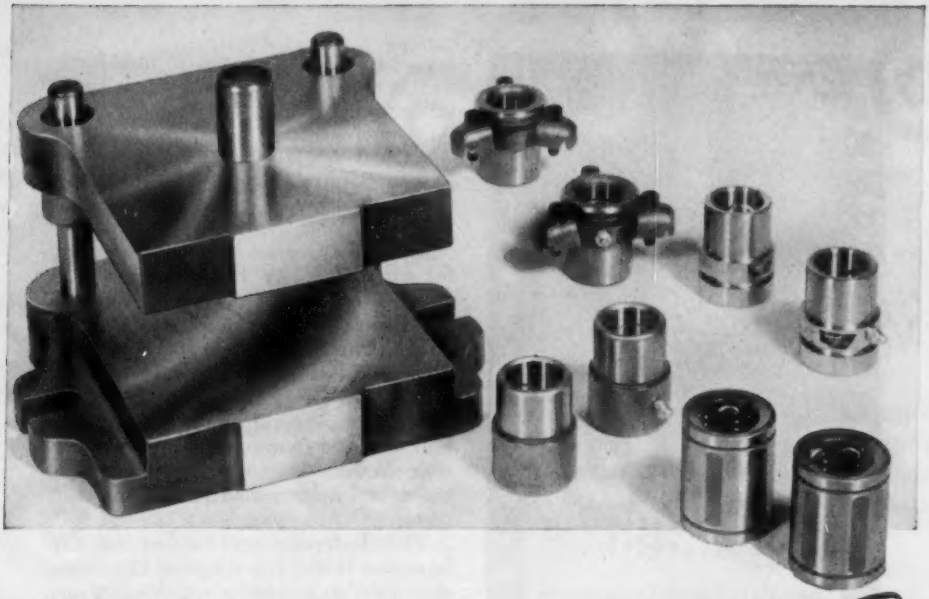

Which BUSHING SHOULD YOU USE?

Your choice is getting broader every day. Each of the guide pin bushings above is good—in the right application. But, some of them cost more than others. Which should you use for best results consistent with cost?

That's where Detroit Die Set can help you. In our 25 years of exclusively building die sets, we've tested a good many types of bushings. Based upon these tests and performance in our customers' plants, we stock and recommend a number of types of bushings for use in our die sets.

To aid you in bushing selection, we've prepared a bulletin on the subject. Just ask for Bulletin 56, and we'll send your personal copy without delay. Detroit Die Set representatives also will be glad to personally aid you in selecting the right bushings and die sets. They're as near as your 'phone.

Offices in Principal Industrial Centers

Detroit DIE SET CORPORATION

2895 WEST GRAND BLVD.
DETROIT 2, MICHIGAN

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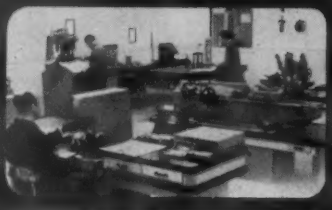

GUARANTEED ACCURACY

has developed from more than 90 years' specialization with practical metrology. The resulting SIP techniques —as used in length measurements by national Bureaus of Standards—may be most profitably applied with SIP UNIVERSAL & LINEAR MEASURING MACHINES, SIP high precision MICRO-INDICATORS, and SIP PROFILE PROJECTORS. How well these techniques and machines can work to your advantage is illustrated in the film offered below. For arrangements, write to:

AMERICAN SIP CORPORATION
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SECOND ANNUAL CONTOUR MACHINING CONFERENCE

The Second Annual Contour Machining Conference was held recently for approximately 1,000 executives in aircraft and missile production, tooling and design. This group, in addition to being primarily responsible for technological development and production of our Air Force, guides the efforts of many thousands of engineers and several hundred thousand aircraft production workers. It is claimed to be one of the most important nationwide aircraft meetings of the year.

The conference was held at the Ambassador Hotel, Los Angeles, Calif., under the sponsorship of True-Trace Corp., El Monte, California.

During the past several years, True-Trace Corporation, producers of tracer controls for machine tools, has noted a lack of information on contour and profile machining methods in the industry. Recognizing the situation as being one which would retard aircraft improvement and production, and being anxious to perform a much needed service to the industry, True-Trace Corporation took the bull by the horns and, with the invaluable cooperation of some of the country's foremost aircraft companies, developed the First Annual Contour Machining Conference, which was held last October. Four hundred invitations to attend the conference were issued. Additional invitations were issued upon request. There were approximately 600 in attendance. All commercialism was eliminated in order to protect and to perpetuate the true objectives of the conference.

According to George F. Fry, Jr., president of True-Trace, the sincere expressions of gratitude from the participants of the first conference, and a

persistant request for another such meeting has been more than adequate reason for True-Trace to sponsor the Second Annual Contour Machining Conference. Airframe problems and their solutions comprised the majority of papers, presented by leading authorities from the major airframe manufacturing plants.

★ ★ ★

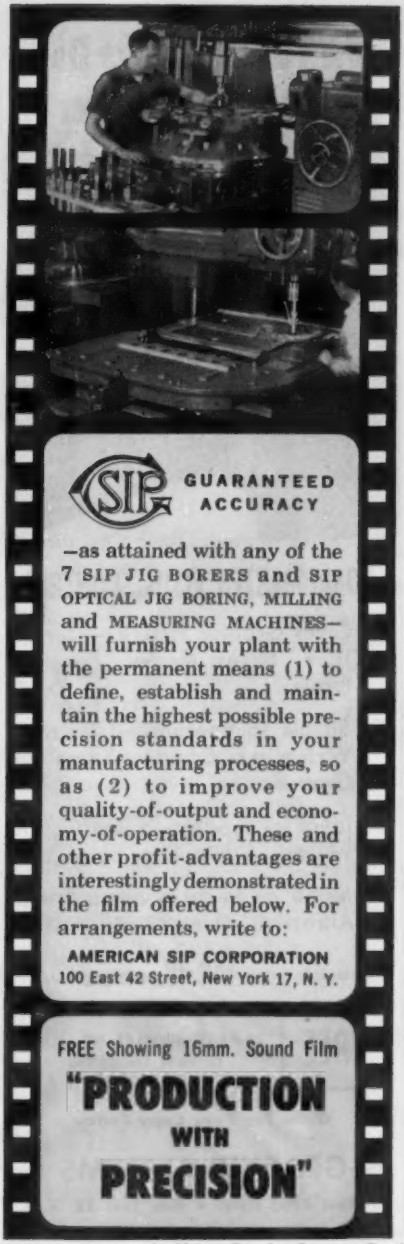
ALEXANDER d'ARCAMBAL RETIRES AS PRATT AND WHITNEY PRESIDENT

It was recently announced that Alexander d'Arcambal retired as president and general manager of the Pratt and Whitney Co., Inc., West Hartford, Conn., on November 1st. Mr. d'Arcambal will celebrate his 67th birthday in January. He will remain active in company affairs in a consulting capacity and as honorary chairman of its board of directors.

At the same time, it was announced that Edward P. Gillane, executive vice president and director, will succeed Mr. d'Arcambal as president.

At the time of his retirement, Mr. d'Arcambal will relinquish his position as chairman of the board of directors of Potter and Johnston Co., Pawtucket, R. I., a Pratt and Whitney subsidiary, and will be succeeded by Mr. Gillane.

Alexander d'Arcambal (left) and E. P. Gillane


SIP
GUARANTEED ACCURACY
—as attained with any of the 7 SIP JIG BORERS and SIP OPTICAL JIG BORING, MILLING and MEASURING MACHINES—will furnish your plant with the permanent means (1) to define, establish and maintain the highest possible precision standards in your manufacturing processes, so as (2) to improve your quality-of-output and economy-of-operation. These and other profit-advantages are interestingly demonstrated in the film offered below. For arrangements, write to:
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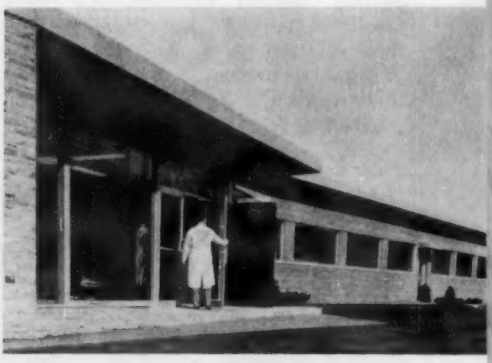


New office addition of the Verson Allsteel Press Company, located in Chicago, Illinois.

VERSON ALLSTEEL PRESS COMPLETES EXPANSION

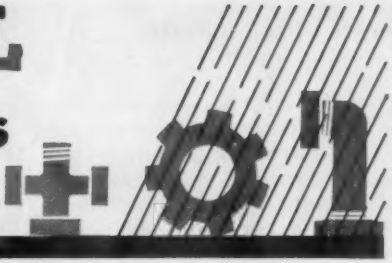
In the latest in a continuing series of expansion moves of the Verson Allsteel Press Company, announcement was recently made of the opening of new offices at the 93rd Street and Kenwood location in Chicago, Ill. The new offices comprise a 6,000 square foot addition to the existing offices. The building is ultramodern in design and construction. It is fully air-conditioned and utilizes the latest in folding walls, recessed lighting and decor.

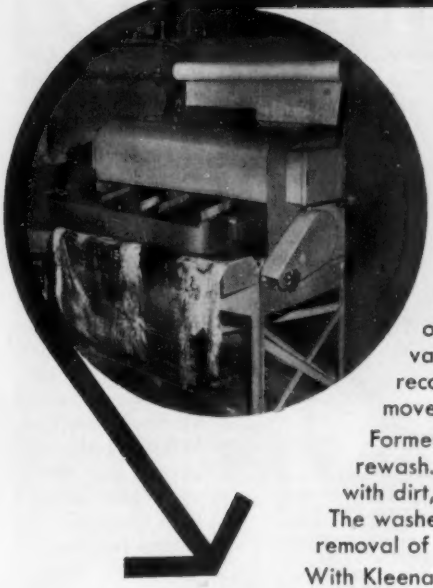
★ ★ ★

GRANITE SURFACE PLATE RECONDITIONING SERVICE

A service, which provides for the reconditioning of worn granite surface plates to "as new" condition, has been announced by Rahn Granite Surface Plate Co., 636 N. Western Ave., Dayton 7, Ohio. Not only is the surface relapped to "as new" accuracy, but the appearance is restored to "as new."

BARNESDRIL
kleenall filters





increase parts-washing efficiency!

BarnesdriL Kleenall Filters are installed on this conveyor-washer line for a variety of parts-washing. The filters recondition the washing solvent and remove dirt and metal particles automatically.

Formerly 50% of the parts were returned for rewash. Washing nozzles frequently plugged with dirt, causing inefficient washing conditions. The washer was shut down 4 hours a week for removal of as much as 2 cu. yds. of collected dirt.

With Kleenall Filters the washing solution needs changing only once every 6 months. Rewashing is eliminated and output of washed parts is stepped-up 100%. The filter elements remove all dirt and keep the nozzles from plugging. The amount of chemicals used has been reduced by 600 lbs. per month.

BarnesdriL engineers have an answer for nearly any kind of liquid clarification problem. Send them yours for analysis and recommendation.

COOLANT
BARNESDRIL
CLEANING

FILTRATION DIVISION

BARNES DRILL CO.

860 CHESTNUT STREET • ROCKFORD, ILLINOIS

DETROIT OFFICE: 3419 South Telegraph Road

For more data circle 336 on Reader Service Card

This service is comparable to taking a planer cut on badly nicked iron surface plates before rescraping them. The granite surface can now be ground down until all nicks are removed. The charge is relatively small, based on thousandths of an inch per square foot, for the amount of granite that must be removed to clean up the deepest nick.

The company will recondition granite surface plates to any degree of Job Graded Accuracy required: toolroom grade 0.0001 inch; inspection 0.00005 inch; or laboratory 0.000025 inch.

★ ★ ★

E. R. PUTNAM JOINS FASTCUT TOOL COMPANY

Earl R. Putnam has acquired one-half interest in the Fastcut Tool Co., Detroit, Mich. He will assume responsibility for design, quality control and manufacturing.

Mr. Putnam was manufacturing superintendent of Putnam Tool Company for more than 20 years, having joined that company at its inception. While in this capacity, he developed several special purpose machines for the automatic production of accurate end mills.

The addition of Mr. Putnam to

Earl R. Putnam

Now Available

LUFKIN

DECIMAL GRADUATED

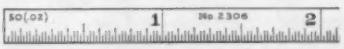
LONG STEEL TAPES

Genuine leather case, Chrome Clad rust-resistant tape, jet black markings in 25 and 50 foot lengths. Graduated in consecutive inches full length, both upper and lower edges, to 10ths (.10) inch.

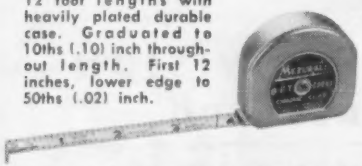
STEEL RULES

TAPE RULES

Rust-resistant Chrome Clad finish, easy-to-read bold black markings, in 6, 8, 10 and 12 foot lengths with heavily plated durable case. Graduated to 10ths (.10) inch throughout length. First 12 inches, lower edge to 50ths (.02) inch.



Machine divided, black filled lines and figures, full range from very flexible to heavy spring tempered with plain or Chrome Clad finish. No. 6 Graduated; 10ths (.10) and 50ths (.02) inches.



THE LUFKIN RULE COMPANY

BETTER MEASURE WITH LUFKIN

443 SAGINAW, MICHIGAN

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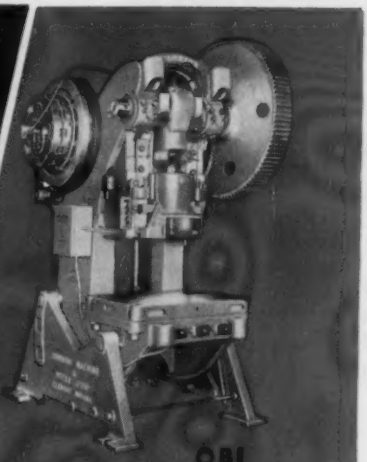
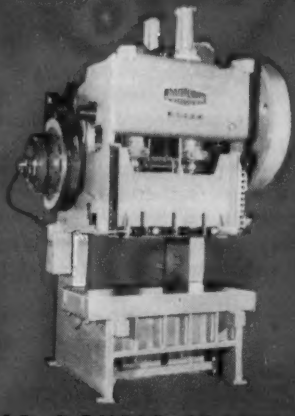
Customers tell us they get MORE for their money... that's why they buy these

3 JOHNSON PRESSES



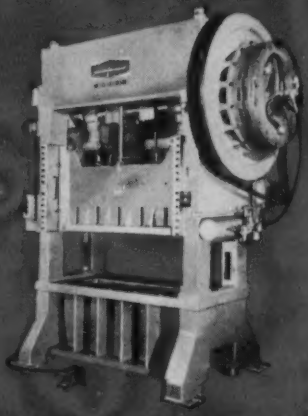
OBI

23 Models ranging from 16 to 150 tons capacity in regular, special wide or high speed types—pin or air clutch.



GAP DOUBLE-CRANK

60-100-125 and 150 ton capacities, steel fabricated, air clutch, flywheel or geared models.



STRAIGHT SIDE DOUBLE-CRANK

40-60-80-100-125 and 150 ton capacities. Tie rod, steel construction and air clutch.

Write for Bulletin 1956

Johnson

MACHINE and PRESS CORP.

620 WEST INDIANA AVENUE • ELKHART, INDIANA

For more data circle **338** on Reader Service Card

Fastcut Tool Company's management staff, accelerates the company's plans for future expansion which call for a complete line of high speed cutting tools. This will augment the present line of combined drills and countersinks, Woodruff keyseat cutters and special made-to-order precision cutting tools.

THE CURVIT 145

— For Coiling Metal —

An unusual Metal Forming Machine designed to put uniform curves in strips, bars and tubes.

Photograph shows one-half inch square steel being formed into coils, finished coil in foreground.

The CURVIT 145 is one of a complete line of Metal Forming Machines made by

Kilham Engineering Co., Inc.

R.F.D. NORTH ATTLEBORO

MASSACHUSETTS

MYrtle 5-6211

For more data circle **339** on Reader Service Card

ADAMAS CARBIDE APPOINTS DIRECTORS

Announcement was recently made of the appointment of seven prominent executives to the newly expanded board of directors of the Adamas Carbide Corp., Kenilworth, New Jersey. According to an official of the company, the continued upward sales trend dictated the move.

The newly selected members of the board are: John L. Adlen, Marius Alex, Harold Hawkey, Paul Hemschoot, Leonard Morey, Ralph Ward and Robert A. Dreyer.

★ ★ ★

TOOLSET MOVES TO NEW AND ENLARGED QUARTERS

Toolset, Inc., recently moved to new and larger quarters at 1411 Military Rd., Buffalo, N. Y. Removal of general offices, engineering, assembly and warehousing to this new location released space for expansion of present machine shop facilities.

The company manufactures a complete line of self-contained, self-stripping units used in conjunction with the piercing and notching ferrous, non-ferrous and non-metallic materials.

GRIND THE

Eastern Centerless Way

Our new plant with increased facilities assures

PROMPT SERVICE

Eastern Centerless Grinding Co

470 Tolland Street East Hartford 8, Conn.

For more data circle **340** on Reader Service Card

Step Up Production, Cut Costs with

HANNA Air and Hydraulic CYLINDERS and VALVES

Use Them For Pushing, Pulling, Pressing, Raising, Lowering, Clamping

In hundreds of simple applications Hanna Cylinder Power has eliminated or reduced manual effort, resulting in greatly increased production and lower costs. Similarly, machines and equipment using Hanna Cylinder Power are assured of long, dependable operation because of the quality and precision built into Hanna products. Your Hanna Representative will be happy to show you how Hanna Cylinder Power can lower your costs. See Thomas' Register or the classified telephone directory for the name of your nearest Hanna Dealer.

Send for Catalog 750A—Air Cylinders to 250 p.s.i., Hydraulic to 750 p.s.i.
Catalog 236B—Air and Hydraulic Cylinders to 110 p.s.i.
Catalog 233B—Hydraulic Cylinders to 1500 p.s.i.
Catalog 254 —Air and Hydraulic Valves.

Hanna Engineering Works

1758 Elston Avenue, Chicago 22, Illinois

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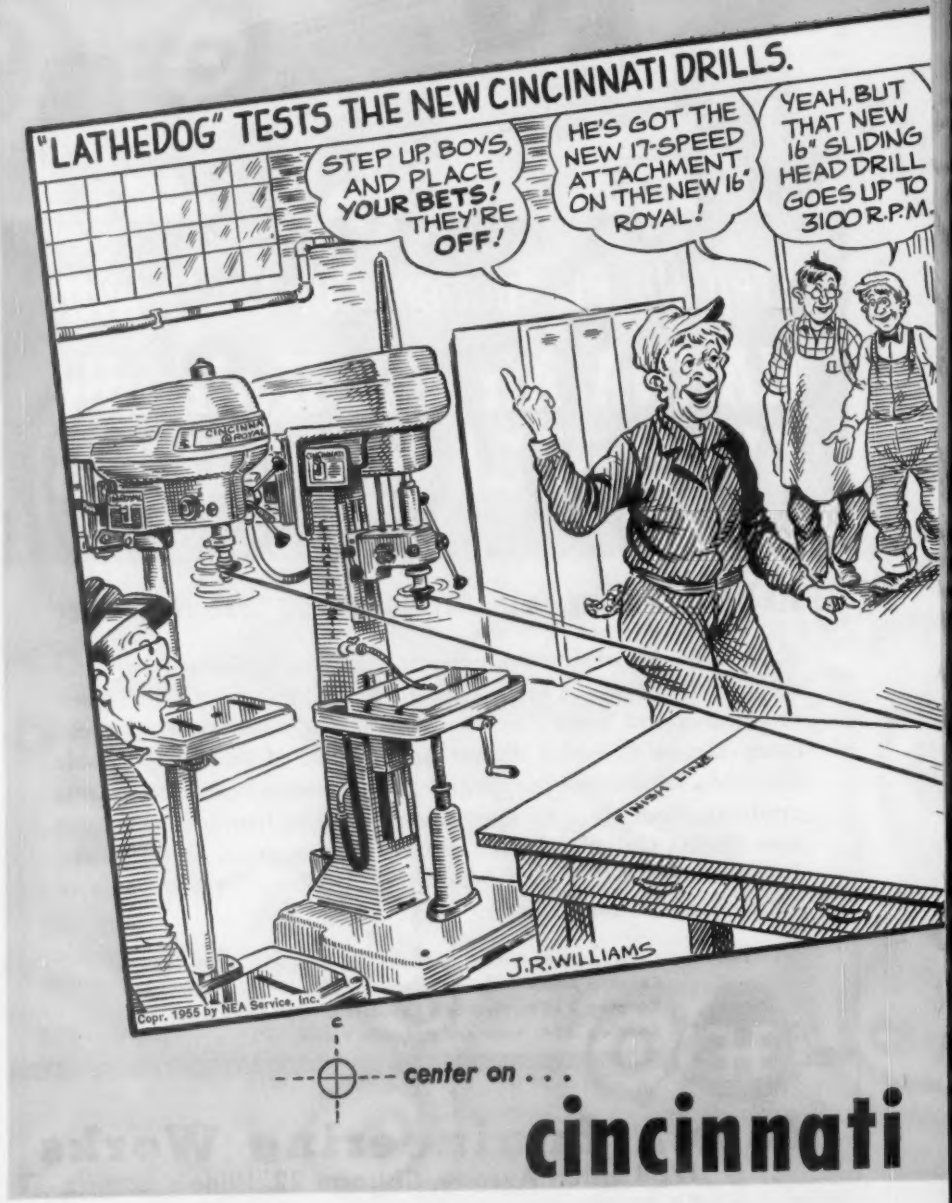
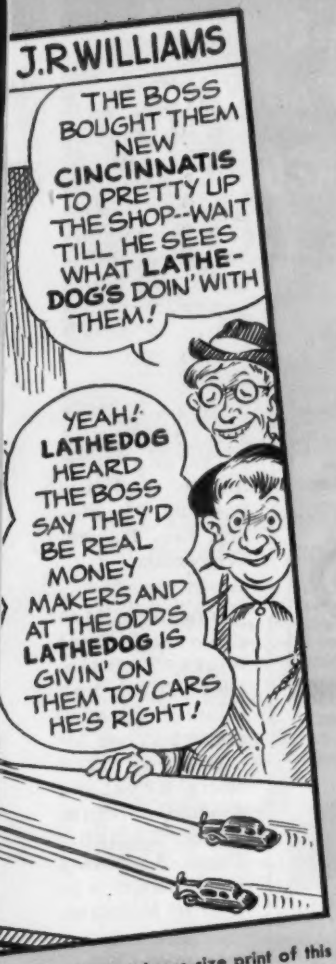
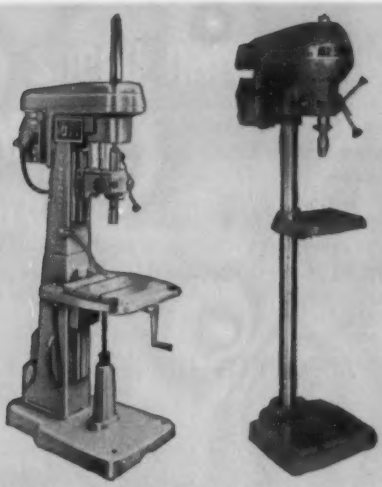

"LATHEDOG" TESTS THE NEW CINCINNATI DRILLS.
STEP UP, BOYS, AND PLACE YOUR BETS! THEY'RE OFF!
HE'S GOT THE NEW 17-SPEED ATTACHMENT ON THE NEW 16" ROYAL!
YEAH, BUT THAT NEW 16" SLIDING HEAD DRILL GOES UP TO 3100 R.P.M.
CINCINNATI ROYAL
FINISH LINE
J.R.WILLIAMS
Copr. 1955 by NEA Service, Inc.

center on . . .

cincinnati


J.R.WILLIAMS
THE BOSS BOUGHT THEM NEW CINCINNATIS TO PRETTY UP THE SHOP--WAIT TILL HE SEES WHAT LATHE-DOG'S DOIN' WITH THEM!
YEAH! LATHEDOG HEARD THE BOSS SAY THEY'D BE REAL MONEY MAKERS AND AT THE ODDS LATHEDOG IS GIVIN' ON THEM TOY CARS HE'S RIGHT!

A large-size print of this J. R. Williams cartoon is available for framing.



Even Lathedog appreciates the money-making possibilities of these two *new* Cincinnati Drills. And the *new* 16" Royals and 16" sliding head drills look every bit as good as they run. They're styled to dress up your shop and make it a real metalworking showroom.

With *new* styling and precision come great *new* features. *New,* built-in power feeds give you the production advantages of automatic operation at slight extra cost. *New,* built-in electrical and mechanical controls on both models give you ease of operation never before possible. *New,* rugged construction and built-in belt guard add operator safety to performance and appearance.

Whatever your drilling needs, be sure to see these great *new* models at your local CL&T dealer's showroom. For catalogs D-134, D-138 and price information, plus the name of the CL&T dealer nearest you, write: CINCINNATI LATHE AND TOOL CO., 3262 Disney, Cincinnati 9, Ohio.

lathes and drills

For more data circle **343** on Reader Service Card

industry news in brief . . .

Empire Tool Company, Detroit, Michigan, appointed national distributors, **Smitco, Inc.,** Cleveland, Ohio.

Donald D. Phillips appointed direct sales representative in northwestern Ohio, **The R. K. LeBlond Machine Tool Company,** Cincinnati, Ohio.

R. T. Johnstone appointed to the newly created position of assistant sales manager, **The Cross Company,** Detroit, Michigan.

H. J. Andresen named sales manager, Crown Products Division, **Hannifin Corporation,** Des Plaines, Ill.

Cam Morawski appointed to sales engineering staff, **Detroit Broach and Machine Company,** Rochester, Michigan. Stanley Staton will be in charge of broach engineering.

Robert C. Tessmer appointed sales engineer, **Racine Hydraulics and Machinery, Inc.,** Racine, Wisconsin.

Niagara Machine and Tool Works, Buffalo, New York, has established a new district office located at 5226 North Keystone Avenue, Indianapolis, Indiana. **Frank L. Kelsey** has been appointed manager.

AMMCO Industrial Equipment, Limited, 1377 Weston Road, Toronto 9, Ontario, Canada, appointed sales representative, **Erickson Tool Company,** Cleveland, Ohio.

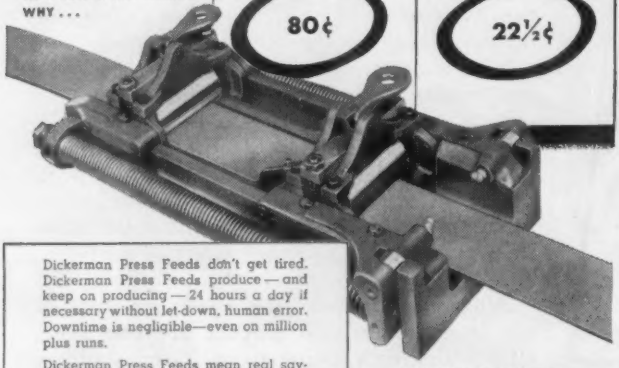
HOW TO FIGURE PRESS FEEDING

Economy!

UNIT COST DOWN, PROFITS UP! WITH DICKERMAN AUTOMATIC PUNCH PRESS FEEDS . . . AND HERE'S THE REASON WHY . . .

Hand Feeding . . .
8 hrs. @ 2000 pieces/hr. 16,000
Labor @ $1.60 hr. $12.80
Cost per M pieces
80¢

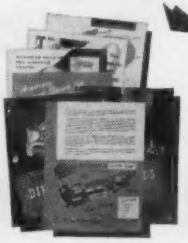
with Dickerman Feeds (83% press efficiency)
8 hrs. @ 100 RPM x 60 48,000
Labor @ $1.60 hr. $12.80
Cost per M pieces
22½¢



Dickerman Press Feeds don't get tired. Dickerman Press Feeds produce — and keep on producing — 24 hours a day if necessary without let-down, human error. Downtime is negligible—even on million plus runs.

Dickerman Press Feeds mean real savings, real gains. Dickerman Feeds cost little to install — pay for themselves in days — pay profits year after year AND as Dickerman Feeds will operate at any speed the tooling will withstand, unit cost drops as production increases. For automation . . . For new economy . . . install dependable Dickerman Feeds on all your press equipment now!

SEND today for catalogs on the complete money-making Dickerman line.



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Low cost–high speed hard-facing with the new METCO THERMOSPRAY process

Hard-facing pump rod with the Metco Type P ThermoSpray Gun

High spraying speeds—high deposit efficiencies —simplified application

The advantages of applying hard-facing materials in powder form for lower finishing costs have long been known. But slow spraying speeds, low deposit efficiencies and high material costs have hindered their wide application. Now, with the development of the new METCO Type P THERMOSPRAY GUN and the THERMOSPRAY Hard-Facing Alloys, these disadvantages have been overcome.

The THERMOSPRAY GUN is the first ever developed to operate without compressed air—only oxygen and gas (acetylene or hydrogen) are required. The THERMOSPRAY Powders are new, self-fluxing alloys of the nickel-chromium-boron type especially developed to provide dense, corrosion-resistant coatings with hardnesses varying from RC-30 to RC-65, depending on the alloy used. The new Gun applies these materials faster than any previously available equipment (8 to 10 lbs. per hr.), with deposit efficiencies of over 95%. Depending on requirements, coatings may be fused after spraying, used semi-fused with a newly developed *Metco Process*, or left unfused.

Here is your opportunity to do your own hard-facing at low cost. For further information send off the coupon. No obligation, of course.

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Telephone: EDGEWOOD 4-1300

In Great Britain: Metallizing Equipment Co., Ltd. Chobham near Woking, England

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industry news in brief . . .

Raymond F. Farley named industrial products field sales manager, **S. C. Johnson and Son, Inc.**, Racine, Wis.

William C. Mullin named sales manager for instrument gages, Gage Division, **Pratt and Whitney Company, Inc.**, West Hartford, Connecticut.

Overgard Machine Tool Co., Inc., 2045 West Eighth Avenue, Denver 4, Colorado, appointed exclusive distributor in Colorado-New Mexico territory, **Rivett Lathe and Grinder, Inc.**, Boston, Massachusetts.

Ralph R. Ryan named sales representative of the Detroit district, Tubular Products Division, **The Babcock and Wilcox Company**, Beaver Falls, Pennsylvania. **Millard A. Hammond** named manager of Welding Fittings Sales.

Ross-Willoughby Company, 1400 Goodale Boulevard, Columbus, Ohio, named distributors, **Horton Chuck Division**, Greenfield Tape and Die Corporation, Windsor Locks, Conn.

Duane E. Webster appointed assistant to director of manufacturing, **Norton Company**, Worcester, Massachusetts. **Frank G. Gifford** named works manager of the abrasive division; **David Reid, Jr.**, appointed factory manager; and **Harold E. White** has been named assistant manager of crushing plants.

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CHATTER-FREE BORING BARS
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MICRO-MILLS & BORE-MILLS
BALL SEAT REAMERS
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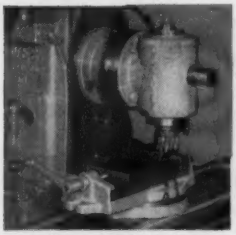
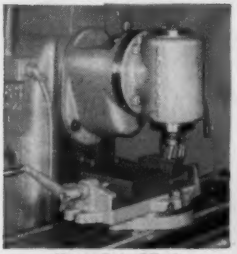
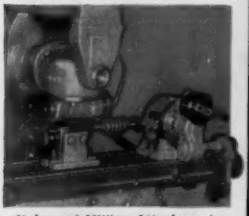


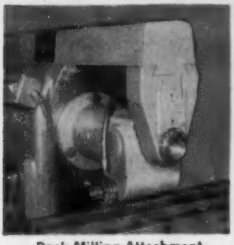
Heavy Duty Vertical Milling Attachment



Heavy Duty Offset Vertical Milling Attachment



Universal Milling Attachment



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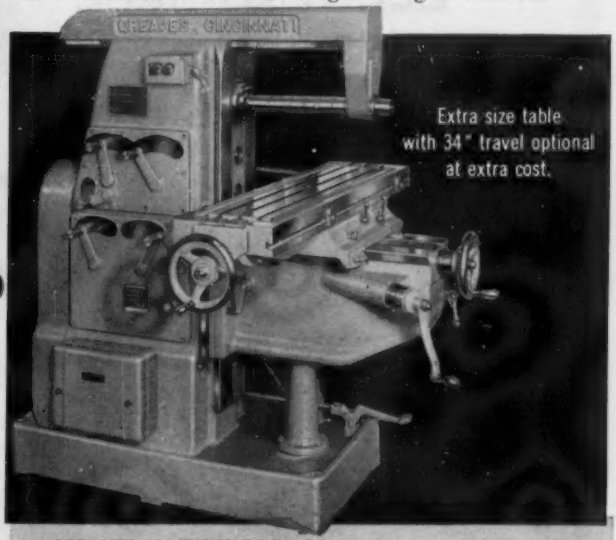
A full line of attachments and accessories offer outstanding flexibility for all types of milling operations . . . with GREAVES MILLS. Make your own comparison of 22 specifications of Greaves and 7 other leading milling machines.



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industry news in brief . . .

Donald Weiss appointed district sales manager, **Verson Allsteel Press Sales Company,** 4716 Anthony Wayne Avenue, Hamilton, Ohio.

James H. Zender has joined the sales engineering staff, **W. O. Barnes Company, Inc.,** Detroit, Michigan.

Edward V. Schuerer named district representative in Wisconsin and the upper peninsula of Michigan, **Torit Manufacturing Company,** St. Paul, Minnesota.

William J. Greene, vice president and director of sales, **The L. S. Starrett Company,** Athol, Massachusetts, retired recently. **Carl O. Newton** will succeed Mr. Greene as vice president in charge of sales. **Cortland A. Bassett** will succeed Mr. Newton as general sales manager.

John Wambold has joined the research staff of **Kennametal, Inc.,** Latrobe, Pennsylvania, as a metallurgical engineer.

Henry A. Lundy elected vice president, **Hardinge Brothers, Inc.,** Elmira, New York. **James P. Wagner** appointed advertising manager.

Paul R. Brucker and **Michael Zetz** named division metallurgists, **Crucible Steel Company of America,** Midland, Pennsylvania. **Thomas A. Carr** has been named supervisor of metallurgy and quality control, Spring Division, Pittsburgh, Pennsylvania.

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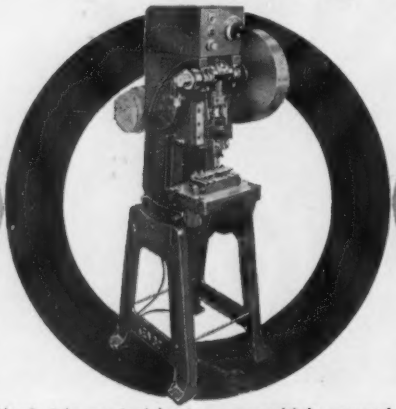
ELECTRO-SAFE
– the safest
punch press
you can buy!



Single-trip control buttons are widely spaced, to keep hands clear of the danger zone. Operator must push both buttons at once...hold them until stroke reaches bottom, then release both buttons to start new cycle. Fail-safe operation. Impossible to "fudge." Impossible for press to double trip.

VERSATILE CONTROLS—You can change from "single trip" to "continuous stroke," or "inching" by merely turning a dial. You can change timing in seconds. No flywheel...no clutching. Write for details.

KENCO MANUFACTURING CO.
Mfrs. of Precision Machinery and Accessories
5211 Telegraph Road, Los Angeles 22, California
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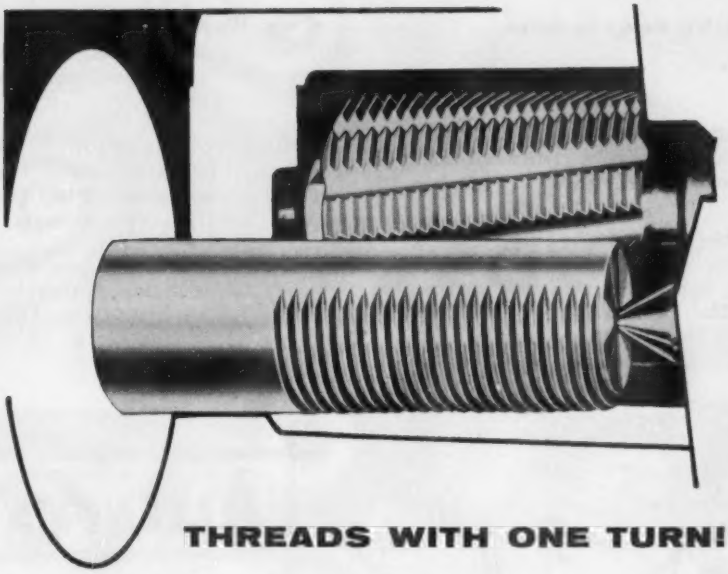

THREADS WITH ONE TURN!

Hanson-Whitney Thread Milling Machines* produce threads with approximately one revolution of the work. Unusual versatility . . . cutting internal, external, straight or taper, left or right hand threads. An exclusive cam design eliminates back lash . . . provides complete automatic cycle for lead, depth, rapid retraction for gaging or loading. Hanson-Whitney **single source** engineering and manufacture of machine tool, cutting tools, fixtures and gages for screw threads, assures production precision. Consult Hanson-Whitney engineering service, always available in the field or at home offices.

Standard models available in

4″ x 9″ (hydraulic)	10″ x 24″
8″ x 16″	15″ x 30″

*Available — larger sizes and/or special cycles; automatic loading — rough and finish cycle; extra length beds, oversize swings.

Write for further information and literature

Hanson-Whitney COMPANY

DIVISION OF THE WHITNEY CHAIN COMPANY

173 BARTHOLOMEW AVENUE • HARTFORD 2, CONNECTICUT

TAPS • THREAD GAGES • HOBS • CENTERING MACHINES THREAD MILLING MACHINES AND CUTTERS

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industry news in brief . . .

Roger Byrnes appointed midwestern district manager, **Adamas Carbide Corporation,** Kenilworth, New Jersey.

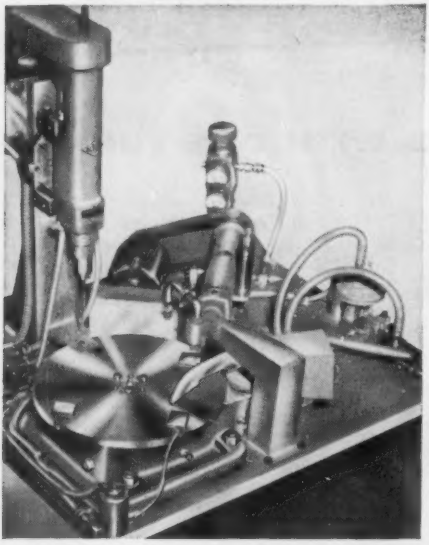
Libb Tool Company, Inc., 75 Laurel Street, Hartford 6. Connecticut, has been appointed stocking distributor for **The Besly-Welles Corporation,** South Beloit, Illinois.

Owen W. Harrison appointed eastern regional sales manager, **The Holo-Krome Screw Corporation,** Hartford, Connecticut.

I. R. Leheney appointed district manager, Cleveland district sales office, **Allegheny Ludlum Steel Corporation,** Pittsburgh, Pennsylvania.

Paul S. Washburn has been appointed field engineer at the Pittsburgh district office, **Norton Company,** Worcester, Masachusetts.

★ ★ ★ ★ ★



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The A. K. ALLEN CO.
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AGENTS IN PRINCIPAL CITIES

CYLINDERS

Plain or with Built-in Valves.
Up to 20" of stroke in stock.

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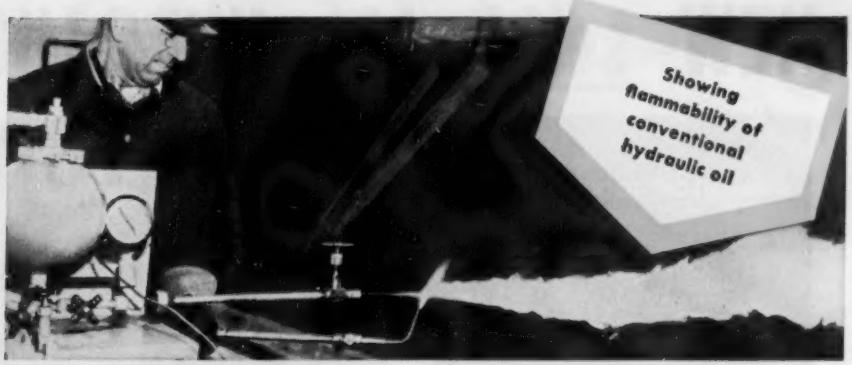
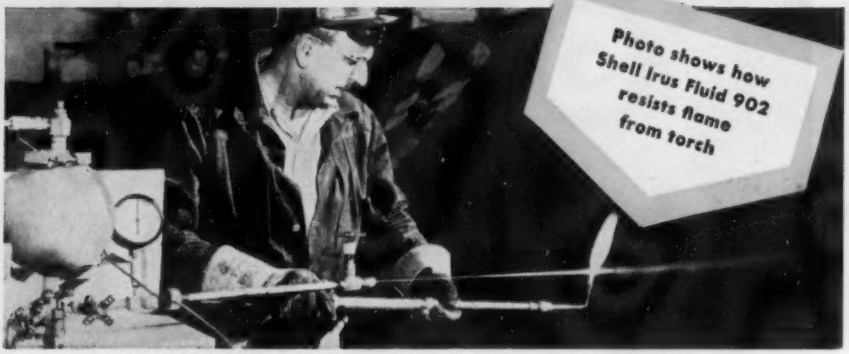




Flame tests prove its fire-snuffing ability

Entirely new formula: Shell Irus Fluid 902 is a special formulation . . . product of three years' development and field testing. It is suitable for nearly all industrial hydraulic systems, as a direct replacement for presently used oils. *Here is a fire-resistant hydraulic fluid that can be widely used.*

Non-corrosive: Shell Irus Fluid 902 contains no corrosive ingredients. It has no harmful effects on seals, fittings or bearings. It does not promote rust.

No major modification necessary . . . simply clean present fluid thoroughly out of system and replace directly with Shell Irus Fluid 902. You can use it with complete confidence. *Write for test data and all information to*

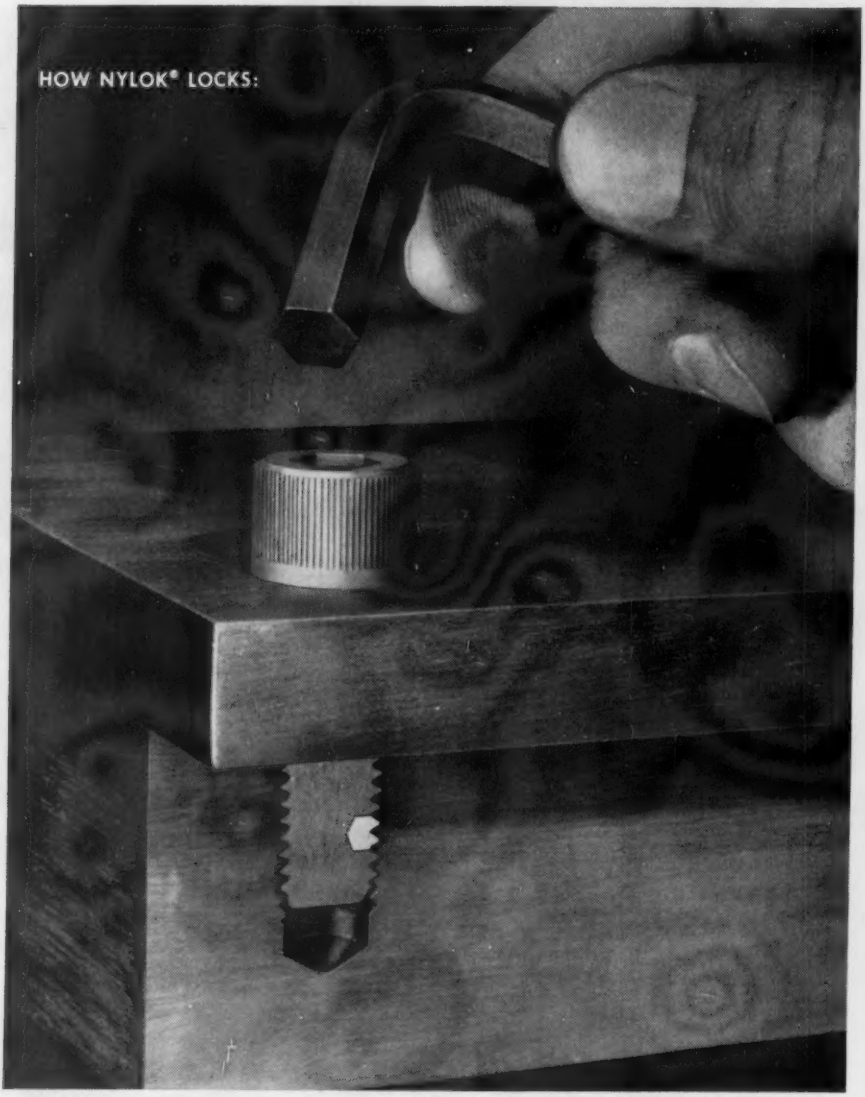
SHELL OIL COMPANY
50 West 50th St., New York 20, New York
or 100 Bush St., San Francisco 6, California

SHELL IRUS FLUID 902

SHELL

For more data circle **351** on Reader Service Card

NEW—self-locking UNBRAKO

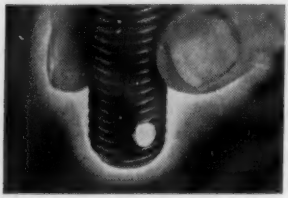


LOCKED! The tough, resilient nylon pellet keys itself into the mating threads. It forces threads together and locks the screw securely.

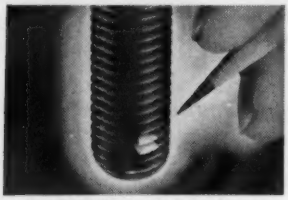
socket head cap screws

They won't work loose. And they simplify design and save production time.

Self-Locking UNBRAKO socket head cap screw.



BEFORE ASSEMBLY. The nylon pellet projects slightly. When assembled, threads will be impressed into it.



AFTER REMOVAL. "Plastic memory" of pellet has expanded impressed threads to greater diameter than screw threads. Screw can be used repeatedly. In use, "memory" keeps threads tightly locked.

UNBRAKO socket head cap screws are now available embodying the Nylok* self-locking principle. Nylok provides the first truly practical solution to the problem of making cap screws self-locking.

An UNBRAKO cap screw with Nylok is a single self-locking unit. No auxiliary locking devices are needed. Just thread the UNBRAKO into any tapped hole. *Seated or not*, it locks positively wherever wrenching stops. The tough, resilient nylon pellet forces mating threads together and holds tight. The screw will not work loose.

You save production time when you make products with self-locking UNBRAKOS. And you get greater simplicity in design with less bulk and weight. The number of parts you must assemble to achieve full locking action is reduced to the absolute minimum. Lockwashers under screw heads are no longer necessary. Costly wiring of cross drilled heads is eliminated. And in many cases you will save weight and mass by using shorter screws in tapped holes instead of drilling through and using nuts and lockwashers.

Self-locking UNBRAKOS are reusable. They have uniform locking and installation torques—with no galling or seizing on mating threads. They successfully withstand temperatures from —70° to 250°F. And, when screws are properly seated, the locking pellet also functions as a liquid seal.

A complete line of self-locking UNBRAKO socket screw products, in a wide range of standard sizes, materials and finishes, is available through your authorized industrial distributor. Technical data and specifications are detailed in Bulletin 2193. Write us for your copy today. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 22, Pa.

**T.M. Reg. U.S. Pat. Off. The Nylok Corporation*

UNBRAKO SOCKET SCREW DIVISION

STANDARD PRESSED STEEL CO.

SPS

JENKINTOWN PENNSYLVANIA

For more data circle **353** on Reader Service Card

Descriptions of new machines, tools and materials for metalworking.

TOOTH HONING SYSTEM IMPROVES SOUND QUALITIES OF HARDENED GEARS

A unique system that applies honing principles to the finishing of hardened gear teeth to improve sound characteristics has been developed by National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich. Called gear honing, this basic gear production system improves sound qualities of hardened spur or helical gear teeth by removing nicks and burrs; correcting small heat-treatment errors in spacing, profile lead or eccentricity and improving surface finish. The manufacturer states that this new method can be economically adapted to both high and low gear production schedules.

Fig. 1—Red Ring Model GHB Gear Honing Unit

To carry out the tooth honing process, the company engineers have developed two initial models of high speed Red Ring gear hone machine tools, as shown in Figs. 1 and 2, that operate in conjunction with a unique new gear tooth honing tool. This honing tool, as illustrated in Fig. 3, is essentially an abrasive-impregnated helical gear that is run in mesh with the hardened gear in crossed axes relationship at high speed. The hardened work gear is driven by the honing tool and traversed back and forth across the honing tool in a path parallel to its axis during the honing operation. The work gear is run in both directions during the process. The process is readily adaptable to manual, semi and fully-automatic loading arrangements. The tool is a throw-away type that is discarded at the end of its useful life.

One of the two models of Red Ring gear honing machines available for pro-

duction is the Model GHA gear hone shown in the close-up view in Fig. 2, which is equipped with an automatic loader and designed to improve sound characteristics of high-production gears by removing nicks and burrs, making minor tooth corrections and improving surface finish. Gears are honed on the Model GHA machine under low-backlash operating conditions with optional brake loading. This ultra-precision fully automatic machine has a specially designed, high-speed tool drive with head and tailstock spindles that can rotate up to 3,000 revolutions per minute, and more. A unique method of mist lubrication with controlled leakage provides a flushing action that assures continuous cleanliness of the super-precision spindle bearings.

The other available model is the Red Ring Model GHB universal gear hone, shown in Fig. 1, which is used when more tooth correction is desired. This machine is ideally adapted to manual, semi-automatic or fully-automatic loading arrangements. When arranged for manual or semi-automatic loading, gears up to 8-inches pitch diameter can be honed on the machine. Gears up to 3-inches pitch diameter can be honed when the machine is equipped for fully automatic loading. Crown honing operations can also be performed on the Model GHB when desired.

A unique feature of the Model GHB gear hone is a patented zero backlash, self-adjusting table arrangement. The headstock and air-powered tailstock are mounted on a tilting table that is attached to the reciprocating work table through a hinged mechanism at the rear. Thus, the head and tailstock can be lowered either manually or automatically for loading the gear into mesh with the honing tool. After loading, the table is tilted upward into zero backlash position and locked, where it remains throughout the gear tooth honing operation during which the work

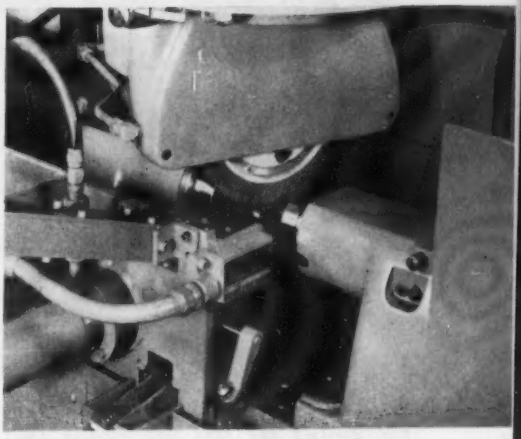


Fig. 2—Close-up view Red Ring Model GHA Gear Hone showing honing tool and unloader

is revolved in both directions. If desired, the tilting table action can be locked out so as to allow for honing under low-backlash conditions with brake loading.

Like the Model GHA, this gear production machine is an ultra-precision type having a specially designed, high-speed tool drive and a spindle mist lubrication system.

The honing action of the abrasive-impregnated gear tooth honing tool removes all nicks and burrs in the tooth flanks. The honing process is designed to remove metal up to 0.002 inch over pins. However, since the honing action tends to accurately generate a tooth form and shape, small corrections in tooth form and lead which will considerably improve the sound characteristics of a hardened agear are made by the process. Surface finishes of fine quality can be readily achieved with the honing process on shaved gears.

A honing cycle of less than one minute will remove nicks, smooth the surface and make sufficient tooth form and lead correction to provide gears of uniform, low sound level. A lubricating-

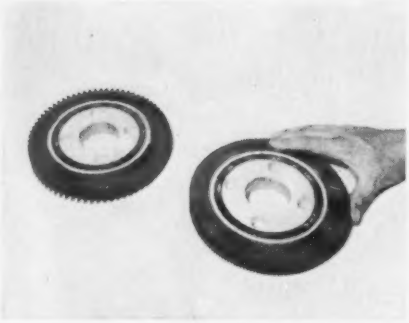


Fig. 3—Two Red Ring Gear Honing Tools

type coolant whose main requirement is the flushing of removed metal from the mesh is used on the machine, thus providing for maximum cleanliness.

Small pinions are rotated at speeds up to 3,000 r.p.m. for the honing process. Larger gears are honed at speeds corresponding to about 800 surface feet per minute.

Red Ring gear honing is a hard gear finishing process. Present methods of generating gear teeth in the soft state should be used. This means hobbing or shaping followed by shaving. Thus maximum uniformity is assured in all soft gears, as well as having suitable form and lead correction allowances made in the teeth before they are heat-treated. This method leaves only the correction of minor form and lead errors up to the honing operation, as well as the removal of any nicks or burrs. By making the most accurate gear teeth possible in the soft state, maximum honing tool life is assured and minimum cost and honing time will result.

Following the heat treatment process, the hardened gears should have their locating holes and/or faces ground in accordance with the usual practice. Then all gears are put through the honing process to remove nicks and improve sound quality. If sufficient control is exerted in the hobbing, shaving and heat treatment process, it is possible to eliminate entirely the conventional hard gear nick testing operation where nicks and burrs are located for later removal by a pencil grinder.

New high standards for sound quality can be achieved on production gears with this system. These high standards can be achieved without increasing production costs, since the cost of the honing operation is considerably less than the cost of finding and removing nicks and burrs from hardened gears.

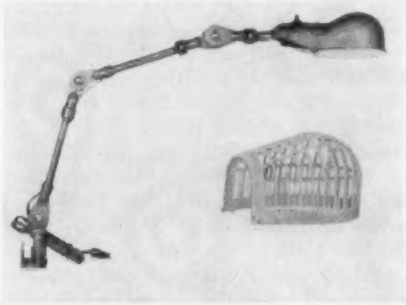
For more data circle **75** on Reader Service Card

★ ★ ★

NYLON SHIELD FOR LAMP REFLECTORS

Fostoria Pressed Steel Corp., Fostoria, Ohio, has announced its nylon Koolshield for Localite reflectors. It is designed as a guard for positive protection from the danger of burns that may happen from accidentally touching a hot reflector caused by the heat of a 100 watt lamp. It snaps on over the lamp reflector and fits all old and new model Fostoria Localites equipped with a half shade reflector.

For more data circle **76** on Reader Service Card

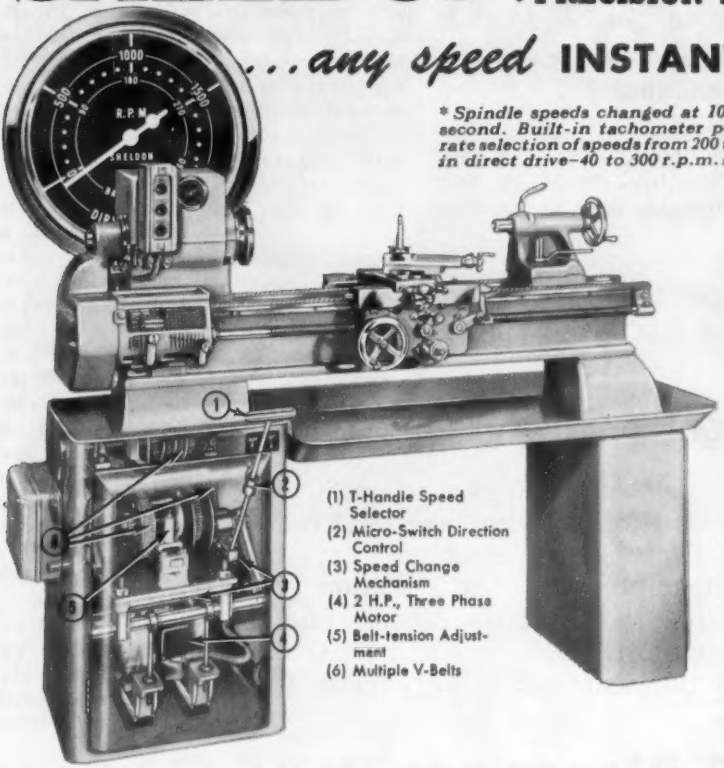


View showing Fostoria Nylon Koolshield

SHELDON *Variable Speed* PRECISION LATHES

. . . any speed INSTANTLY *

** Spindle speeds changed at 100 r.p.m. per second. Built-in tachometer permits accurate selection of speeds from 200 to 1800 r.p.m. in direct drive—40 to 300 r.p.m. in back gear.*



This new lathe instantly meets every changing speed requirement in the tool room, or quickly sets and holds to any prescribed speed for production runs.

Rugged, Heavy-duty Variable Speed Drive—an oversized unit with double V-belts throughout that delivers positive full-power to the spindle.

High Spindle Speeds—from 200 r.p.m. to 1800 r.p.m. (direct drive), from 40 r.p.m. to 300 r.p.m. in back gear.

Instant and Automatic (power driven) Speed Selection—Only 9 seconds to change from low to high speeds in either direct drive or backgear. Speeds are changed automatically when T-handle is lifted or pushed into engagement.

High Horsepower at All Speeds—Because the drive unit is oversized, it has larger belts which deliver maximum gripping power at all speeds. A 2 H.P., three Phase motor recommended.

Additional lathe features: Zero Precision tapered roller spindle bearings, 54 pitch gear box, heavy cast pedestal, tool-room accuracy. Optional accessories include hardened bed ways, L00 long taper key drive or 4" D1 Camlock spindles.

Sheldon Precision Variable Speed Drive Lathes are available in 11" or 13" Swing. Model WM-56-P (Illustrated) less motor and switch, $1,944.00 F.O.B. Chicago. Other 10", 11", and 13" Sheldon Precision Lathes from $832.00 up. Also 13" and 15" Sebastian Geared Head Lathes, Sheldon Milling Machines and Sheldon Shapers.

Write for Catalog

SHELDON MACHINE CO. INC. 4250 N. KNOX AVE. • CHICAGO 41, ILL.

For more data circle 354 on Reader Service Card

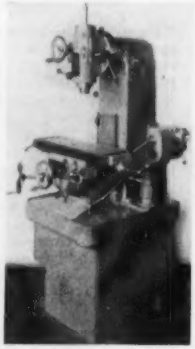
new shop equipment . . .

HIGH EFFICIENCY VERTICAL MILLING MACHINE

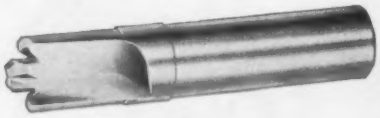
Aaron Machinery Co., Inc., Dept. M, 45 Crosby St., New York 12, N. Y., has introduced the Imperial Model M-1 Vertical Milling Machine. This milling machine is noted for precision workmanship. The sturdy design, heavily ribbed frame and a head practically free of noise and vibrations, insure stability and smooth running. Main spindle and transmission gears are of high grade steels hardened by improved heat treatment methods.

The machines are finished to Schlesinger tolerances. The vertical head swings up to 90 degrees in each direction. Angular position of the head is indicated on a graduated scale. The vertical position of the head is specially locked. The spindle is adjustable and its movement is limited by a stop. Fine adjustments are made by worm gearing and handwheel after disengaging the clutch; rough adjustment by hand wheel.

The milling spindle drive comes from 1½ h.p. motor, 2 speed motor by v-belts



View of Aaron Vertical Milling Machine



"NO PROBLEM!"

This automotive valve seat of alloy steel was no problem for Grinnell Screw Products Co. of St. Clair Shores, Michigan, says their Plant Superintendent Carl Brauer. "We simply tooled with B&W rougher and finisher trepanning tools and had no trouble, although the seat was a very close tolerance job."

300 Pieces per Hour

"Roughers run about 15,000 parts per grind, with 50 to 60,000 tool life; finishers 20,000 per grind and 100,000 tool life. We have used B&W tools for every job possible for about seven years — for aluminum, brass and steel, because they work better and stand up longer," says Superintendent Brauer.

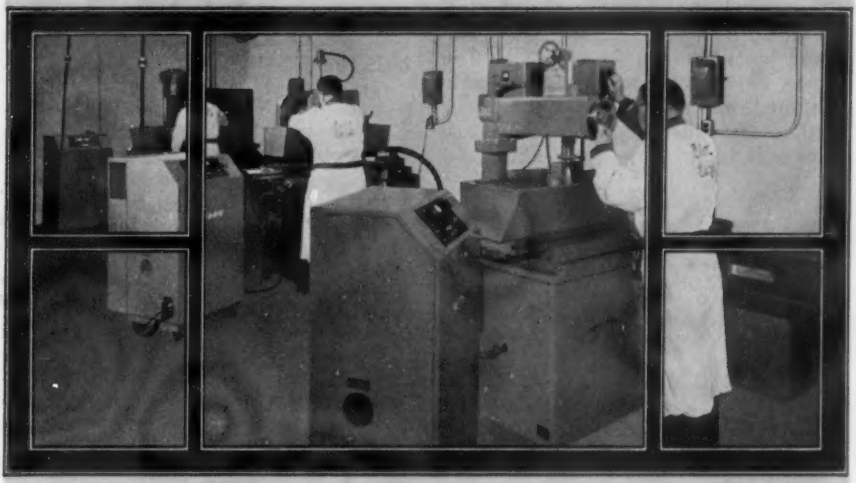
Send your blueprints for prompt prices to

B & W PRECISION PRODUCTS CO.
11393 E. Eight Mile Rd., P.O. Box 3865, Detroit 5, Mich.

For more data circle 355 on Reader Service Card

a room with a view

TO THE FUTURE

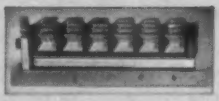


This is the Elox "Demo Room". The demonstration center where we prove that the machining of jobs formerly difficult or impossible can be done with ease and economy by Electrical Discharge Machining.

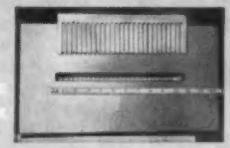
This "proof division" at Elox will run not just a few samples for you but enough quantity production to provide a real evaluation of how Elox E.D.M. can save time and money in your plant. Tungsten carbide tipped single point tools, forging dies, die casting dies and tungsten carbide form tools will be machined at a cost we guarantee cannot be duplicated by any other method. Make use of our Elox "Demo Room". It has proven to hundreds of alert firms that these jobs can be done better, faster, less expensively.

WHATEVER YOUR COSTS ARE NOW . . . CONTACT ELOX

WE SAVED 15 MINUTES grinding this single point tungsten carbide tip boring tool.



WE SAVED 16 HOURS plus 9 different operations on this form grinding of a carbide broach.



WE SAVED 379 HOURS on the machining of this die casting die.

elox corporation of michigan

1839 N. Stevenson Hwy.
Royal Oak 3, • Michigan
*T.M.Reg.

For more data circle **356** on Reader Service Card

over a hardened and ground back gear or direct over v-belts and runs without vibrations. It is also equipped with electrical push-button control. Six automatic feeds ranging from 0.47 to 9.85 inches per minute provide serviceable combinations, allowing full use to be made of the machine. Adjustable stops disengage the automatic movement instantaneously. Special accessories include single and multiple indexing heads and profiling equipment.

For more data circle **77** on Reader Service Card

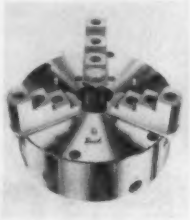
★ ★ ★

DUSTPROOF CHUCK

Buck Tool Co., 914 Schippers Lane, Kalamazoo, Mich., has announced a dustproof chuck which permits using the full capacity range. The dust proofing mechanism in no way interfers with the workholding use of the chuck; and according to the manufacturer, it is the only dustproof chuck featuring a hole through the center.

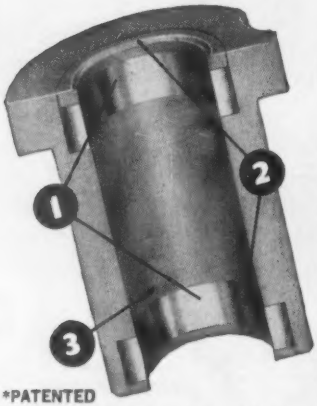
The chuck has been developed for grinding machines and dividing heads and wherever abrasive dust and metal chips are a problem and can be used either dry or wet.

For more data circle **78** on Reader Service Card



Buck Dustproof Chuck

INCREASE PRODUCTION.. SAVE TIME & MONEY



MEYCO

Carbide Inserted Bushings Are Doing It Daily!

How? Like this: (1) Last longer . . . with a life—in most cases—as long as solid carbide bushings at prices that approach the price of steel bushings; (2) Increased life for your drill jigs and fixtures; (3) Increased life for your drills and reamers; (4) Accuracy maintained for a LONG PERIOD of time; (5) Less non-productive machine time, less lost man-hours, because bushings need not be changed as often; (6) Inspection time saved, because of greater accuracy for a longer time; and (7) Less waste due to spoilage, for the same reason. Don't pass up a good bet! Get the dope on MEYCO Carbide Inserted Drill Jig Bushings today!

*PATENTED

1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

For information and prices write for MEYCO Bushing Catalog No. 43

ESTABLISHED 1868

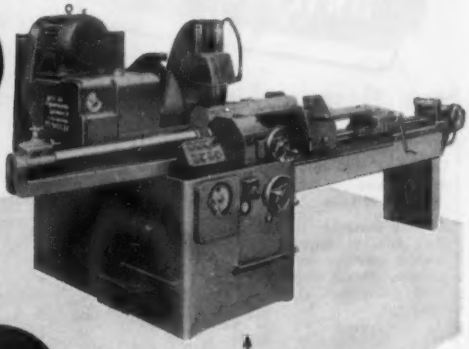
W. F. MEYERS CO., INC., BEDFORD, INDIANA

For more data circle **357** on Reader Service Card

THE Triple-Chip METHOD IS A *Triple-threat*

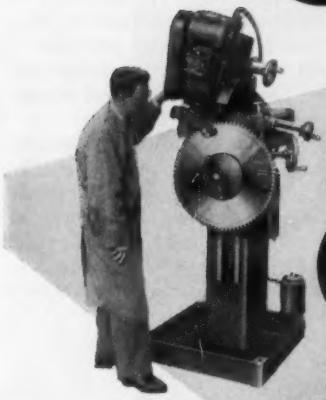
TO HIGH CUTTING COSTS

CIRCULAR SAWING MACHINES



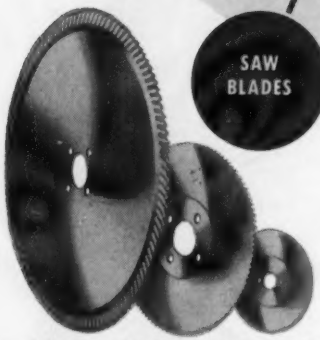
The No. 2-8 machine for cutting off solid metal up to 8" square.

SAW BLADE SHARPENERS



The G-45 sharpener for blades 8" through 48" diameter.

SAW BLADES



M. & M. saw blades cut any machinable metal. Cut-off blades: segmental — 11" through 120" diameter; solid — 8" through 20" diameter. Slitting saws — 3" through 8" diameter.

You may profit immensely by applying the M. & M. Triple Threat to *your* cut-off costs. Machine, blade, and grinder, made by the first company to build all 3, often effect phenomenal savings, as proved by detailed case studies. *Just such a study of your job is yours for the asking.* We offer you an unmatched experience in the sawing of any machinable metal, round, square or structural shapes, from 1/4" through 43" diameter.

THE MOTCH & MERRYWEATHER MACHINERY CO.

MACHINERY MANUFACTURING DIVISION

CLEVELAND 13, OHIO

Builders also of Production Milling, Vertical Turning, Automatic and Special Machines

For more data circle **358** on Reader Service Card

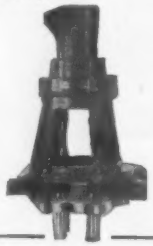
Only

THRIFTMASTER
Universal Joint Type
DRILL HEADS

have these exclusive* features

*Standard Full Ball Bearing Construction, including Spindles

Driving assembly is *Full Ball Bearing* mounted with 3 Bearings on each spindle. Thrust load carried by radial thrust bearings.



*Standard Slip-On and Slip-Off Template Construction

For accurate setting and locating spindle brackets are machined to receive slip-on and slip-off template.

6 Standard Models . . .

Models U-608 and U-1000—Ball Bearing

Models U-620B and U-1012B—Plain Bearing, 11/16" or 1/2" min. centers

Models U-608-BS and U-1000-BS—Ball Bearing Gear Case, Plain Spindles

Semi-Standard Heavy Duty Full Ball Bearing . . .

1/2" in Cast Iron—1-7/16" min. centers
7-1/8" or 9-3/4" Dia.

1/2" in Steel—1-13/16" min. centers
7" or 9-5/8" Dia.

Also Larger Adaptations and Full Line of Fixed Center Drill Heads.

WRITE FOR FULL INFORMATION

Subsidiary of
Thomson Industries, Inc.

THRIFTMASTER *Products Corporation*

1034 N. PLUM STREET
LANCASTER, PA.

Also Makers of
DORMAN AUTOMATIC REVERSE TAPPERS

For more data circle 359 on Reader Service Card

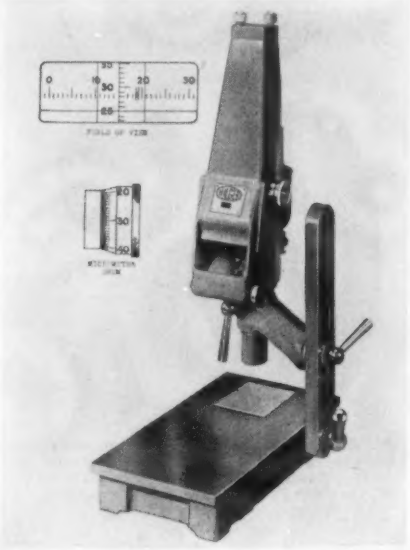
new shop equipment . . .

PROJECTION ANGLE DEVICE READS TO ½ SECOND

A new model Hilger & Watts Projection Angle Dekkor, has been announced by the Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill., and is now equipped with an optical micrometer for direct reading to ½ second, thus approaching in sensitivity the well known Microptic Auto-Collimator. For rapid inspection and production jobs, this improved instrument provides a simple and direct means to determine squareness, parallelism, tilt, and change of angle, regardless of distance.

With a reading accuracy far beyond that available in previous models, the angle dekkor combines in an original design the well known principles of auto-collimation with a projection screen and a precision micrometer.

For more data circle 79 on Reader Service Card



Hilger & Watts Projection Angle Dekkor

7" 1 HP — $1950.00

12" 2 HP — $1985.00

...the entirely NEW

ABRASIVE *six eighteen*

hand feed precision surface grinder!

You're gonna be nuts about this entirely new Abrasive Surface Grinder. Everyone else in your company will, too! The new Abrasive Six Eighteen combines new size (6" x 18") and modern design with new Abrasive-engineered operational features.

Our new illustrated catalog tells all . . . all about Abrasive's effortless anti-friction roller ways; totally enclosed motorized spindle; new, chatterless cable table drive (successfully tested for over 1,000,000 quick reversals); convenient, waist high table and elevating hand wheels; deep, heavily-ribbed saddle; optional 12" or 7" wheel head; and how you can have the elevating and table hand wheels on either right or left.

Yours Free!

ABRASIVE
Machine Tool Company
East Providence 14, Rhode Island

ABRASIVE

For more data circle **360** on Reader Service Card

new shop equipment . . .

CONTINUOUS HIGH PRODUCTION FROM PRECISION FACING MACHINE

A special Heald Bore-Matic developed for precision facing automatic transmission parts and geared to meet the high production requirements of the automotive industry provides continuous valve body production at a rate of 270 parts per hour at 75 per cent efficiency. The machine has been developed by the Heald Machine Co., Worcester 6, Massachusetts.

A constantly rotating trunion type fixture moves the parts in a circular path between and at right angles to the two boring heads. The boring heads are in opposed positions and precision facing of two valve bodies clamped on either side of the fixture is done simultaneously. The 12 station fixture rotates at approximately ½ r.p.m. producing two finished parts every 20 seconds.

Tooling consists of two multiple toolholders each carrying eight single point carbide facing tools. Boringheads to which toolholders are fastened are slide mounted (6 inches travel) for tool change or stock removal adjustment.

In normal operation, operator attention is limited to loading and unloading parts. Foot treadle operated fixture release leaves operator's hands free to unload and load sets of parts during a 60 degree segment of fixture rotation without stopping machine.

Raw parts pass through checking

BIG • FAST • ECONOMICAL

model J

HEAVY DUTY BAND SAW
(WET OR DRY)

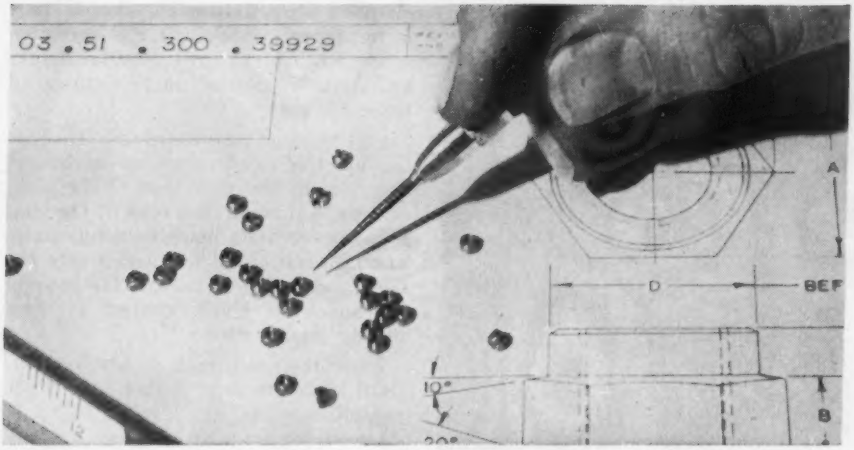
FEATURES

Large Capacity
Semi-Portability
Versatility
3-point Suspension
Operational Safety
Centralized Controls
Speed—Accuracy
Lowest Cost

The finest metal cutting band saw available . . . and at the lowest price. The big, rugged Johnson Model J easily handles 10" rounds, 18" flats—automatically. A brute for work, the versatile Model J is available in standard wet or dry models. See for yourself how much time, labor and money you can save with a Johnson saw.

Johnson MANUFACTURING CORPORATION
Main Plant— 1012 Barnes Street
Albion, Michigan

For more data circle 361 on Reader Service Card



FLEXLOC MICROSIZE locknuts meet designers' needs for tiny precision nuts that retain strength and holding power in the smallest assemblies—servomechanisms, electronic and electrical equipment, all miniature devices.

New FLEXLOC Microsize Locknuts

Now available in Alloy Steel, Stainless Steel, Brass and Aluminum for lighter, more compact designs

New FLEXLOC Microsize locknuts are smaller and lighter than regular FLEXLOCS of the same nominal diameter. Wrenches of smaller size are used to install them. Mating joints or flanges can be designed smaller—with no loss in strength or convenience of assembly.

Microsize FLEXLOCS have all the advantages of larger FLEXLOCS. One-piece, all-metal construction—nothing to put together, come apart, lose or forget. Use them as lock or stop nuts—they stay put anywhere on a threaded member as soon as the locking threads are fully engaged. Uniform locking torques insure accurate preloading. There are no non-metallic inserts to pop out or deteriorate. Moisture, dryness, oil won't affect these Microsize FLEXLOCS. Just screw them on. They lock and stay locked. Vibration won't shake them loose.

For complete information on Microsize FLEXLOCS, consult your authorized SPS distributor. Or write STANDARD PRESSED STEEL CO., Jenkintown 22, Pa.

SIZE	Across Flats		Shoulder Height		Across Corners	Height +.000 −.003
	MAX.	MIN.	MAX.	MIN.	MIN.	
0-80 NF-3B	.111	.107	.047	.042	.123	.075
1-64 NC-3B	.127	.123	.0635	.0585	.141	.090
1-72 NF-3B	.127	.123	.0635	.0585	.141	.090
2-56 NC-3B	.158	.153	.068	.063	.176	.105
2-64 NF-3B	.158	.153	.068	.063	.176	.105
3-48 NC-3B	.190	.183	.071	.066	.210	.120
3-56 NF-3B	.190	.183	.071	.066	.210	.120
4-40 NC-3B	.190	.183	.072	.067	.210	.120
4-48 NF-3B	.190	.183	.072	.067	.210	.120

SPECIFICATIONS: Available in brass (plain or cadmium plated) and aluminum (plain or chemically treated), for temperatures to 250°F; alloy steel, 18-8 stainless, for temperatures to 550°F.

FLEXLOC® LOCKNUT DIVISION

STANDARD PRESSED STEEL CO.

SPS

JENKINTOWN PENNSYLVANIA

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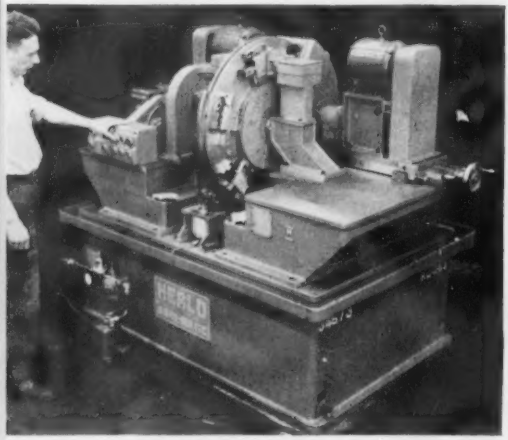


Heald Precision Facing Bore-Matic Machine

stations prior to machining. Micro switches connected to the checking mechanism stop fixture rotation if part is improperly loaded or has excessive stock. Push button reverses fixture rotation for repositioning or removal of defective part.

Convenience features of this machine include the ample work or part storage area at the right end of the base, an access door at the rear of the machine to facilitate machine setup and a gravity chip chute fabricated into the base and inclined toward the rear of the machine. Cycle control is completely push button.

From the machining standpoint, this Bore-Matic removes 0.050 inch stock (aluminum) and provides a finish of 20 micro or better with excellent flatness. While this machine is primarily designed for manual loading and unloading, special conveyor and part handling equipment can turn this into a completely automated setup.

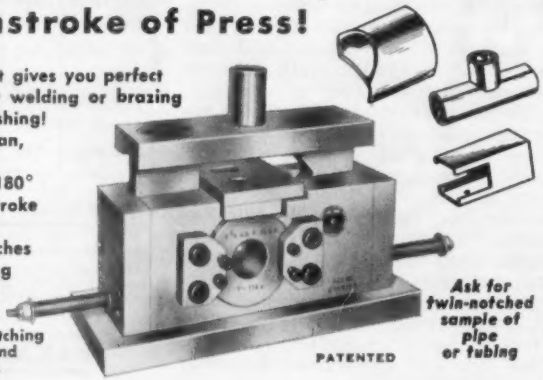
For more data circle **80** on Reader Service Card

the **ARC-TWIN** *Cuts Two Perfect Notches*

in *One* Downstroke of Press!

SAVING both time and cost, it gives you perfect T-joints — instantly ready for welding or brazing without deformation or finishing! Twin-acting punch shears clean, from inside out, leaving two matching notches (in perfect 180° alignment) with every downstroke of the punch press. Quickly interchangeable dies and punches accommodate pipe and tubing from ½" to 2⅜" O.D.; special units, up to 3" O.D.

Special Arc-Twins for double notching stainless steel or monel metal and units built to your specifications can also be furnished.



PATENTED

Ask for twin-notched sample of pipe or tubing

VOGEL TOOL AND DIE CORPORATION 1823 North 32nd Avenue Melrose Park, Illinois

For more data circle **363** on Reader Service Card

Why the Die Designer Prefers PRODUCTO Die Sets

He can specify Producto with complete confidence

The die designer likes to specify Producto die sets on his blueprints because they are a nationally-accepted "brand." They're easy to get anywhere... and delivery is prompt.

He favors Producto because he knows he never has to compromise his die design. Even if the die layout is a little unusual, he will be able to select a die set to accommodate it from Producto's wide range of thicknesses and styles.

He also knows Producto has the equipment that can cut his tooling costs by letting him adapt his sets to a more economical *basic* design. Only Producto offers him complete foundry, pattern-making, welding and machining services for his special requirements.

The die designer recognizes Producto's Qwik-Fit Guide Pins as an important new feature that die makers want. He specifies them because they save up to 75% of the time normally required for die set assembly and disassembly.

The die designer likes to use Producto's new catalog, the industry's most practical tool. His die layout is simplified when he uses Producto die set templates. And Producto provides him with cost-saving ideas in the DIE SET DIGEST.

Most important, he can depend on *consistent* Producto die set accuracy to transfer from the drawing board to the press the precision and ingenuity of his die design.

Yes, the designer has found that Producto die sets justify his confidence in specifying Producto. You will, too.

TWO FREE AIDS to more economical, efficient use of die sets are available from Producto. All-new CATALOG NO. 11 makes ordering and selection job easy. DIE SET DIGEST gives valuable tips for designers, builders and users of dies. Write for them today.

THE PRODUCTO MACHINE COMPANY
910 Housatonic Ave., Bridgeport 1, Connecticut

Wherever die sets are used

PRODUCTO

PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

For more data circle **364** on Reader Service Card

FAST DELIVERY . . .

from this medium-size Detroit stamping plant.

For value and service, Whitehead is your source. Any metal—any special material. Whitehead has dies on hand for O.D. sizes ⅛″ to 18″; any I.D. you want; any thickness from .002″ to ⅜″.

In stock: S.A.E. standard light, medium, and heavy steel washers; brass and copper, small and large patterns; bolt sizes.

Get this catalog for your files by writing Whitehead at Detroit.

55-4

WHITEHEAD EST. 1903

WHITEHEAD STAMPING CO.

1673 W. LAFAYETTE BLVD.
DETROIT 16, MICHIGAN

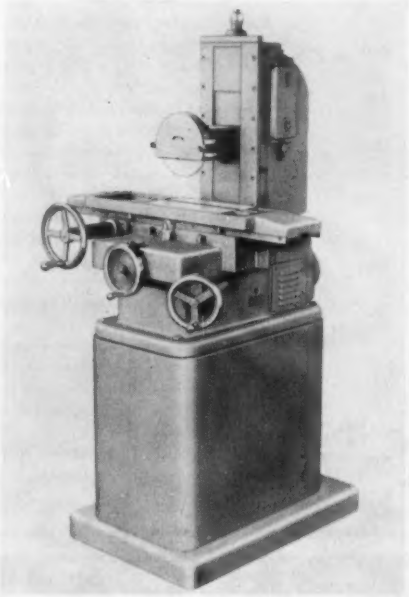
For more data circle 365 on Reader Service Card

new shop equipment . . .

HAND FEED SURFACE GRINDER

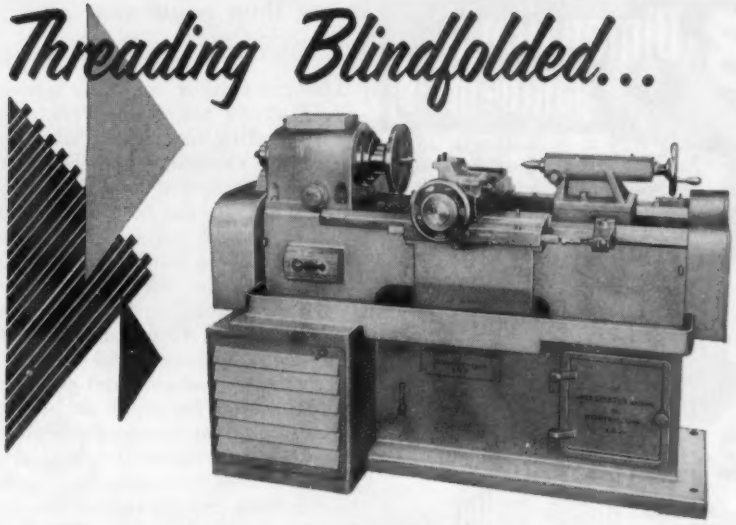
Covel Mfg. Co., Dept. 723, Benton Harbor, Mich., has announced its precision 6 x 12 hand feed surface grinder, called the Excel No. 7A. The elevating hand wheel is located below the level of the table. This handy location places the graduations on the wheel and point of grinding wheel contact with the work where the operator can see both simultaneously. It also eliminates reaching over head when bringing the grinding wheel down. The floating dial pointer eliminates the need to add or subtract when determining the amount of stock to be removed.

A smooth timing belt drive actuates the table. There is no rack and pinion.



View of Covel Excel No. 7A Surface Grinder

Threading Blindfolded...



It's really possible with the NEW
COULTER Model "B" THREADING MACHINE

HERE IS YOUR INTRODUCTION TO THE *NEW* COULTER MODEL "B" HIGH SPEED, SINGLE POINT THREADING MACHINE . . . *the machine with an automatic threading cycle!*

Never before has a threading machine been so easy to operate! Just put the work in, push a button and the COULTER "B" goes through a predetermined threading cycle; coming to a stop when the piece is threaded — set for the next piece, *automatically!* You never worry about the thread diameters, for the "In-and-Out" tool mechanism controls the diameters, *automatically.*

A Few Exclusive Features

- ...A worm and gear spindle drive!
- ...Work spindle operates in one direction of rotation!
- ..."Pick off" gears permit changing from one pitch to another quickly!
- ...Electrically controlled clutch assures starting and stopping on time!

Thread it Better, Faster . . . AUTOMATICALLY, with a COULTER.

For Information on the New COULTER "B", write, wire, phone.

The *James Coulter Machine Co.*
Machine Tool Builders Since 1896

641 Railroad Avenue
Bridgeport 5, Conn.

For more data circle **366** on Reader Service Card

3-Dimensional panto-miller

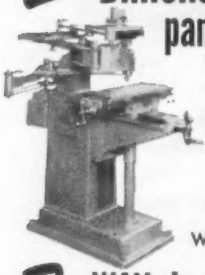
Accurate pantographic milling on either flat or curved surfaces.

New

CAPACITY
SENSITIVITY
ACCURACY
CONTROL

An economical answer to many production problems. Send for Bulletin PM3-B.

2-Dimensional panto-miller



Versatile and dependable for continuous service, the J&B "Panto-Miller" 2A:

ENGRAVES
PROFILES
DIE CUTS
MILLS

Write for Bulletin PM2-B.

3-WAY Indexing Trunnion

Simple, Rapid, Positive positioning of workpiece or jig for all angle Drilling, Tapping, or Counterboring. Available with Chuck, Faceplate, or Right-Angle Adaptor Plate. Complete with Station Selector. For details, ask for Bulletin IT3-B.

J&B
EST. 1870

JOHNSON & BASSETT INC.
PRODUCTION TOOL DIVISION
WORCESTER, MASSACHUSETTS

For more data circle **367** on Reader Service Card

new shop equipment . . .

The result is a smoother grind. The lead screws are made from a special long-wearing lead screw steel and are precision thread-ground. Hard chrome table ways insure long-lived accuracy and eliminate the need for periodic re-scraping. The special plating process used applies a hard chrome surface to the V and flat ways after they have been precision hand scraped from a master plate. According to the manufacturer this economical surface grinder, with its features and performance, make it ideal for shops unable to make the investment previously required for a precision grinder. It gives precision performance on a wide variety of tool-room work and its rugged construction makes it suited to many jobs.

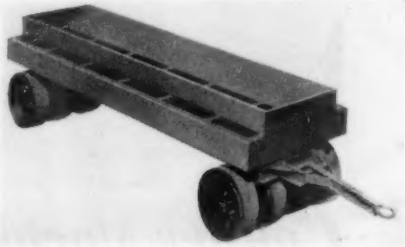
For more data circle **81** on Reader Service Card

★ ★ ★

HEAVY-DUTY TRAILER

Palmer-Shile Co., 16022 Fullerton, Detroit 27, Mich., has announced a heavy-duty trailer. The trailer has been designed for handling heavy loads in factories and production shops. It consists of heavy fabricated steel construction, all welded, either fifth wheel or castor type. The trailer is built to customer specifications including platform height and capacity of the unit.

For more data circle **82** on Reader Service Card



View of Palmer-Shile Heavy-Duty Trailer

Everyone "Mikes" accurately with a FEDERAL MIKEMASTER

Clamping Ring
Deeply knurled. Locks spindle evenly and tightly.

Tungsten Carbide Anvils
Ground, lapped and polished to be flat and parallel.

Uniform Anvil Pressure
Assures consistent accuracy regardless of "feel" of the operator.

Dull-Chrome Plating
Provides attractive, long wearing finish and non-glare contrast for barrel graduations.

Push Button Anvil Retraction
Provides ample clearance for quick insertion or instant release of workpiece.

Tolerance Hands
Are set by these two setting screws and colored in red for optimum visibility.

Patented

Accurate Measuring Threads
Large, highly precise and uniform; permit easy, accurate, turning of barrel throughout its length.

Clear Graduations
Black, sharp, widely spaced; easy to read against dull chrome. Vernier provided for set-up. Range 0" to 1".

Quick Reading Indicator
6 jewel, Low Friction Movement; clearly marked, clearly calibrated scale graduated in .0001".

The Mikemaster gages with the same uniform pressure, regardless of who is using it. It's fast, easy to read, and outstandingly accurate . . . widely used both as a Micrometer and an Indicating Snap Gage. Try this handy tool on your own work! Send for descriptive folder.

Federal Products Corporation
61411 Eddy Street • Providence 1, R. I.

Ask FEDERAL *First*

FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting, or Automation Gaging

For more data circle **368** on Reader Service Card

new shop equipment . . .

FOUR-INCH ROTARY TABLE

Mico Instrument Co., 80 Trowbridge St., Cambridge, Mass., has introduced its No. 640 four-inch rotary table. The device is designed to be an accessory in circular milling, engraving or graduating work. The table has a ⅜-inch diameter center hole with ⅝-inch counterbore accurately located for the mounting of a work-holding stud or clamp. The top rotates through 360 degrees and has an accurately graduated scale with readings to one degree and to one minute with the vernier.

The table is locked in working position by a knurled thumbscrew which permits quick changes. The assembly is mounted by means of hold-down screws through slots in base flanges. The unit is precision machined and treated with a corrosion-resistant finish. Overall dimensions are 6¾ inches by 4⅛ inches by 1-3/16 inches. Weight is 3½ lb.

View of Mico No. 640 four-inch Rotary Table

For more data circle 83 on Reader Service Card

★ ★ ★

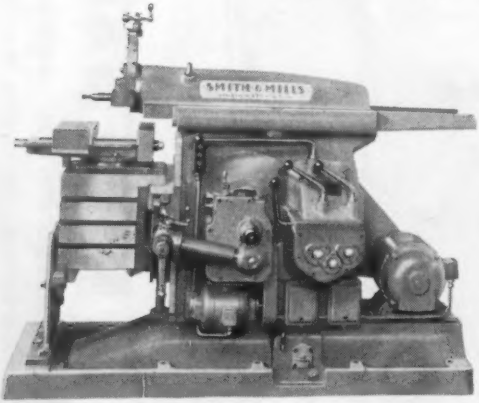
TOOLS WITH BONDED CERAMIC TIPS

The Raybestos Div. of Raybestos-Manhattan, Inc., Bridgeport, Conn., has announced its ceramic tipped tool line. The tools, developed by the divi-

★ ★ ★ ★ ★

SMITH & MILLS SHAPERS

for production and tool room

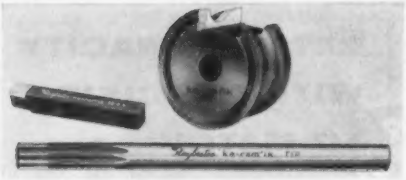


Ram, bull gear, rocker arm and universal table trunnion made of nodular iron for extra rigidity.

Compare Smith & Mills with any other shaper for versatility, speed, cutting power and precision performance. *Compare* and you'll *buy* Smith & Mills—famous for high quality shapers since 1888. Write or wire for prices, deliveries, repair parts or field service. Smith & Mills Shaper Division, Nebel Machine Tool Corp., 3409 Central Parkway, Cincinnati 25, Ohio.

Smith AND Mills SHAPERS CINCINNATI

For more data circle 369 on Reader Service Card



Raybestos Keramik ceramic tipped tool line

sion's special products department, are to be marketed under trade name, Keramik. It is said that they are the first cutting tools to have ceramic tips bonded to steel shanks. Ordinarily ceramic bits are clamped in a holder.

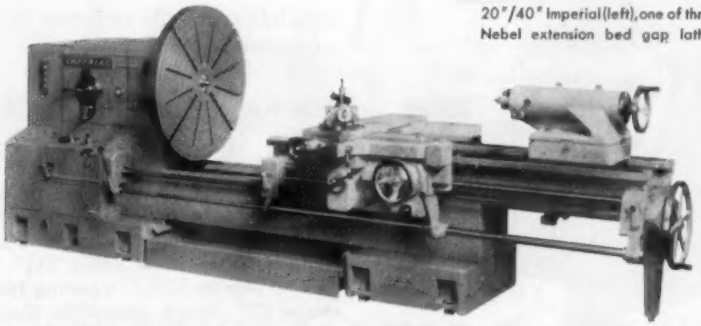
The Keramik cutting tools, the tips being oxide-base ceramic, are being offered in a standard size of ½ inch by ½ inch by 3½ inches (BR-8-M and BL-8-M) with a lead angle of seven degrees, as well as other sizes.

When the tools have been properly ground, they will produce a fine finish comparable to a commercial grind. In addition they will cut materials that most carbide-tipped cutting tools cannot cut, and will do this at faster speeds. However, the tools can also be operated at slower speeds if desired, because of the rigidity of the tool shanks. The company said that tests have shown that the tool bits outlast other cutting tools, up to 20 to one. The manufacturer states that no cutting oils are necessary, the cutting tips run cool and chips will not weld to them and because of low thermal conductivity, there is no build-up on the cutting edges and no cratering. In addition, the tools are non-absorbent and unaffected by corrosion. The integrated design of the cutting tools—the ceramic tips and shanks being bonded units, will enable operators to work in small areas heretofore virtually impossible with mechanical holders with ceramic inserts.

For more data circle **84** on Reader Service Card

★ ★ ★ ★ ★

20"/40" Imperial (left), one of three Nebel extension bed gap lathes



Nebel *double duty* extension bed gap lathes

You can (1) turn your outsize, odd-shaped parts in the wide, deep gap of Nebel extension bed gap lathes. And (2) with the gap closed, you can do all your engine lathe work, too. Double duty means lower capital investment, more efficient use of floor space. Sizes 20"/40" and 28"/50". Nebel removable block gap lathes 16"/27", 20"/30", 25"/40"; engine lathes 16" to 36". Write for bulletins. Nebel Machine Tool Corp., Cincinnati 25, Ohio.

Nebel LATHES CINCINNATI

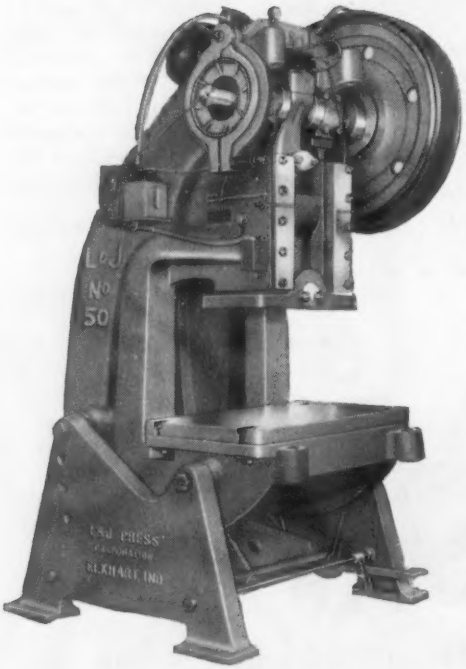
For more data circle **370** on Reader Service Card

L&J 50 SERIES

EXTRA CAPACITY WITH PRECISION TO MATCH

Large area dies are no problem when you have an L&J No. 50 Series press with its extra capacity. The exceptionally heavy frame provides maximum rigidity which enables the flanged, box-type ram to maintain precision alignment for precision jobs. The large work area will permit you to run a greater variety of work. Its dependability and tooling ease provide a new high in press efficiency.

Available in geared and non-geared models. Air clutch is available. It will pay you to get complete details now.



SPECIFICATIONS

Capacity: *Model 50*—50 tons, *Model 50B*—56 tons. **Shut Height:** 10" to 25". **Ram Stroke:** 3" to 8". **Ram Adjustment:** 3". **Ram Face:** 24" x 12". **Bolster Plate:** 36" x 24" x 2¼". **Throat Depth:** 12½". **Opening Thru Back:** 22". **Speed:** *Model 50* Non-geared—100 S.P.M., Geared—50 S.P.M. *Model 50B* Non-geared—95 S.P.M. Geared—46 S.P.M. *Higher speeds with air clutch.*

Write for Bulletin L-14
14 to 90 ton O.B.I. Presses, 20 to 50 ton Straight Side Presses.

L&J PRESS CORPORATION
1624 STERLING AVENUE, ELKHART, INDIANA

For more data circle **371** on Reader Service Card

Leading MACHINISTS and TOOLMAKERS

prefer Atrax

Precision Ground

SOLID CARBIDE TOOLS

Write today for your copy of the complete ATRAX CATALOG of Carbide Tools containing recommended applications and selection tables.

Atrax

THE ATRAX COMPANY

Newington 11, Conn.

For more data circle 372 on Reader Service Card

new shop equipment . . .

PUSH BUTTON CONTROL SWITCH

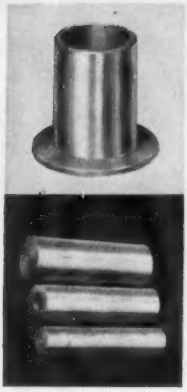
The Electrical Mfg. Division, National Acme Co., 183 E. 131st St., Cleveland 8, Ohio, has announced its Namco Gold-N-Ring Sealtight push button control switch. Rated 600 volts AC or DC, this new dust, oil, and water-tight unit is of heavy-duty construction and meets all J.I.C. and National Machine Tool Builder's Association specifications. It is designed for a wide range of applications in both the original equipment and replacement markets. This includes machine tools, printing presses, packaging machines, automated production machinery and many others that require dependable high-quality performance from components that go to make up modern control stations and panels.

Exploded view of Namco Control Switch

Built to mount in 1-13/64 inch diameter holes on standard panel mounting centers, the switch will accommodate panel thicknesses of from 1/16 to ¼ inch in increments of 1/32 inch. Complete interchangeability of units and their components provides for flexibility and ready adaptation to multiple assemblies. Switches

MISTKOP
STOPS MIST
COLLECTS MIST-FOG EFFECTIVELY
IN A SMALLER SPACE
NON-ELECTRONIC!
This efficient Mistkop unit provides low-cost mist control for all machining operations employing coolants or lubricants. Requires no duct work or costly piping—*is actually portable!*
Mistkop is sturdy in design—has a minimum number of parts and gives long, trouble-free service. Stops clouding of lights . . . eliminates fire hazards of uncontrolled mist. Write for detailed description.
AGET Manufacturing Company
1398 Church Street • Adrian, Michigan

For more data circle **373** on Reader Service Card



THE *Simplest Answer* TO YOUR BEARING PROBLEMS

The availability of oil-filled, self-lubricating sintered powdered Bronze Bearings is greatly enlarged by the many sizes that are included in the new Bunting Standardized sintered Bronze stock line. Chemical and physical specifications of these Bunting stock bearings are ASTM-B202 Type I, Class A. The material also meets the requirements of SAE Type I Class A, AMS-4805 and MIL-B-5687A Type I Comp A. The basic composition is 90% copper and 10% tin of high purity.

This high quality powdered bronze with built-in lubrication together with Bunting Cast Bronze Bearings made of Bunting No. 72 Bronze (SAE-660) give mechanical production and maintenance the means of finding the simplest, best and most economical answer to any bearing problem.

BOTH Bunting Cast Bronze and Bunting oil filled, self-lubricating sintered powdered Bronze Bearings and Bars are available to you through your nearest Bunting Distributor. He has in stock all sizes for your immediate needs. Ask him or write for complete lists and dimensional data on Bunting Cast Bronze and Bunting Sintered Bronze Bearings.

Bunting®

BUSHINGS, BEARINGS, BARS AND SPECIAL PARTS OF CAST BRONZE AND POWDERED METAL

The Bunting Brass and Bronze Company • Toledo 1, Ohio • Branches in Principal Cities • Distributors Everywhere

For more data circle 374 on Reader Service Card

can be obtained in flush-plate or box-type mountings to permit any combination of individual push button, selector or pilot light assemblies. Box covers and flush plates are provided with captive screws to facilitate installation and easy-to-read legend plates lock into position.

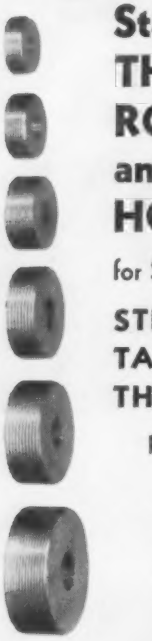
Single and double pole contact blocks can be used interchangeably with the several different types of push button and selector operator heads. Their design permits easy access and ample space for good secure wiring or use of stake-on lugs without interference. Heavy-duty terminal screws (⅜ inch No. 8-32) prevent stripping during installation and permanently secure wires for continuous trouble-free service. Brass inserts molded into contact block secure stationary contacts and provide maximum thread support for terminal screws. As an added convenience, terminal screws are equipped with captive flat and lock-type washers.

Interchangeable collars are supplied in three different heights to enable changing from a flush to extended type button by merely changing the collar. Buttons are available in an assortment of colors to conform with standard codes.

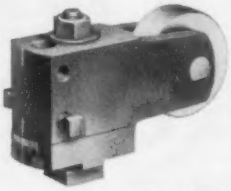
Other design features of the switch include plastic shields to completely enclose the extra large silver alloy contacts, unit-molded main contact block to assure perfect alignment and simplify assembly, fully guided plunger of cross head design to prevent binding and diaphragm to seal out oil, water and rust.

For more data circle **85** on Reader Service Card

REED ROLLED THREAD DIE CO.



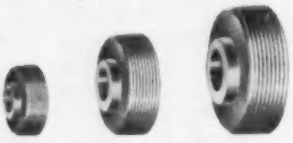
Standardized THREAD ROLLS and HOLDERS



6 HOLDER SIZES CARRIED IN STOCK

for Single Thread Roll Applications on

STRAIGHT or TAPER PIPE THREADS



Rolls for Common Thread Sizes Carried in Stock

Tool engineers, setup men and operators have accepted enthusiastically Reed's standardization of thread rolls for single roll applications. These rolls with the new Reed Single Roll Holder provide a complete package of simple thread rolling tools of wide capacity. Special rolls also available for all types of holders.

Write for Thread Roll Bulletin 1–16

REED ROLLED THREAD DIE CO.

Specialists in Thread and Form Rolling Tools and Equipment

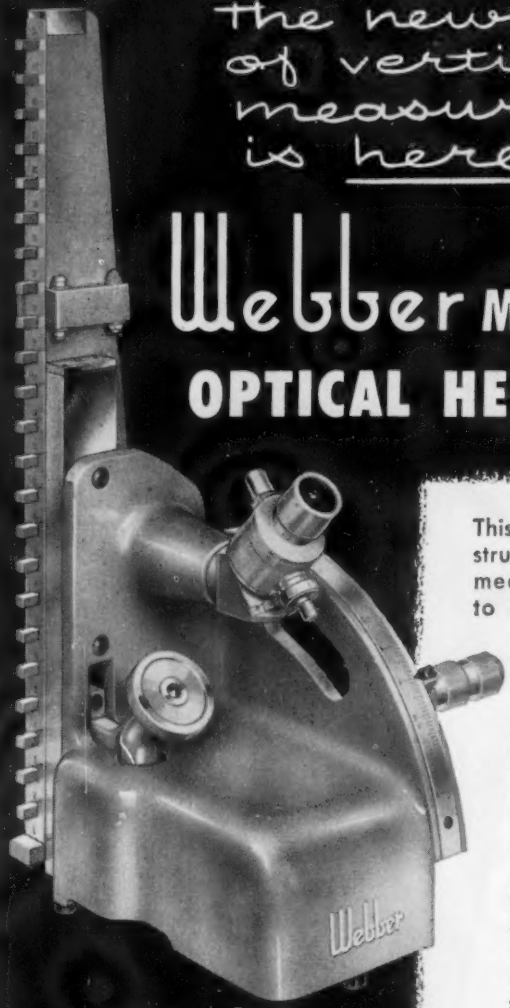
WORCESTER 1, MASSACHUSETTS, U.S.A.

TR1156

For more data circle **375** on Reader Service Card

the new concept of vertical measurement is here

Webber Micro-Accurate OPTICAL HEIGHT GAGE



This revolutionary new instrument will make micro measurements in the 1" to 61" range with an hitherto unknown overall accuracy of ± .000005" per inch.

These fantastic measurements are made speedily and easily by the average skilled workman.

Next to your Gage Blocks the new Webber Optical Height Gage will be the most useful tool in your shop. There is nothing like it in all the world.

Webber GAGE CO.

12899 Triskett Rd., Cleveland 11, Ohio

For more data circle 376 on Reader Service Card

new shop equipment . . .

ALUMINUM OXIDE ABRASIVE

The Norton Co., Worcester 6, Mass., has announced its latest aluminum oxide abrasive known as 44 Alundum. It is being produced under closely controlled conditions employing latest available techniques by utilizing a special electric furnace process. The abrasive is a non-premium product which is economical to use in a wide variety of grinding operations. Its primary benefits, when compared to other non-premium priced abrasives, are greater toughness, higher inherent strength, finer crystal structure and greater sharpness.

Because of these outstanding advantages, grinding wheels with this product offer such benefits as longer life, holds form longer, more workpieces per dressing, better finish, faster cut, cooler cut and more production per wheel.

Its ability to hold form and remain sharp between dressings has made the compound well suited to grinding applications such as ball bearing grinding, honing sticks, centerless, cylindrical and internal precision grinding, saw gumming, snagging, thread grinding, mounted wheels and disc wheels.

For more data circle **86** on Reader Service Card

NOW . . .

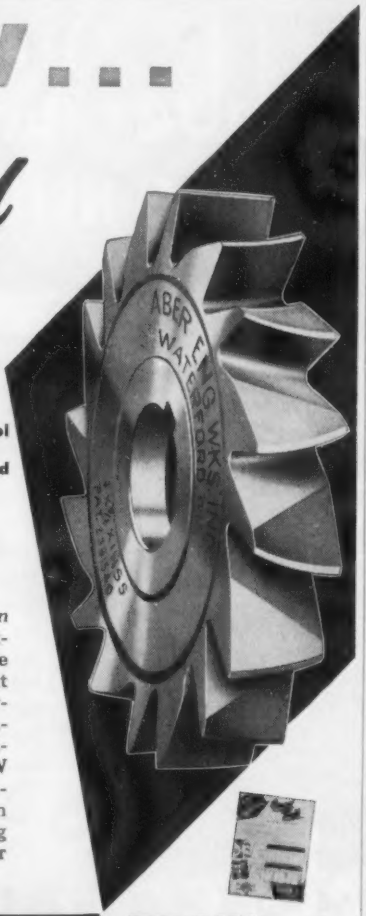
ABER

Curved Tooth

MILLING CUTTERS

1. Give More Accurate Control of Limits and Finish
2. Elimination of Chatter and Breakage
3. Extended Cutter Life
4. Better Performance
5. Increased Production

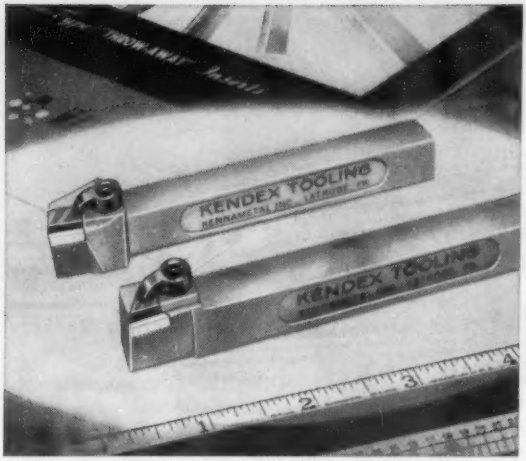
Patented Curved Tooth Design of all *Aber Cutters* permits faster, easier operation, because the curve of the tooth face is built up and strengthened at the corner of the tooth which first enters the cut. This makes possible a *SHEARING ACTION* and eliminates the shock of contact with the work. Dissipation of heat is faster, eliminating friction. . . . Write today for complete information.



ABER ENGINEERING WORKS
WATERFORD, WISCONSIN

FREE DATA
on "How to Sharpen Curved Tooth Milling Cutters" Helpful Cutter Sharpening instructions for your grinding room.

For more data circle **377** on Reader Service Card



NOW, Small Kendex* Button Tools with turnover "throw-away" inserts

Kendex Holders in the small size (illustrated) have ½" square by 4½" long shanks. They take ⅜" square or ¼" (inscribed circle) triangular inserts.

...for light machining on high production operations... especially useful for boring operations

Another variation of the popular Kendex Tooling is now available. This is the new ½" Kendex Holder, available in four styles, for use with triangular or square Kennametal* "turn-over" button inserts . . . making available small tools with the many advantages and economies of the Kendex principle:

- grinding is eliminated.
- inserts are indexed quickly to each new cutting edge.
- machine downtime is reduced to a minimum.
- production is increased.

If you are interested in small-sized, rugged, dependable clamped-type tooling, ask your Kennametal tool engineer to show you how these small Kendex holders can be used to advantage on your operations. Or write for Booklet 301. KENNAMETAL INC., Latrobe, Pa.

*Registered trademark

B-5975A

Small-sized Kendex Tools are equipped with Kennametal chip breakers and solid Kennametal seats to back up inserts.

Kennametal inserts for small Kendex holders are stocked in a number of grades including the new K7H grade for high velocity operations and for machining heat-treated or high tensile steels.

Tell us your small-tool problem and our tool engineers will help you select the right tool and grade of cutting edge.

INDUSTRY AND **KENNAMETAL**

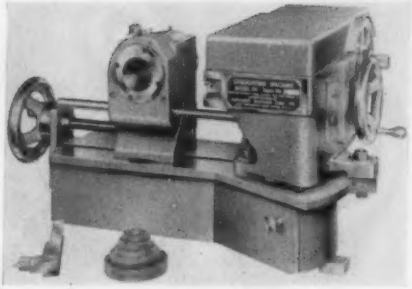
...Partners in Progress

For more data circle **378** on Reader Service Card

new shop equipment . . .

CIRCULAR GRADUATING MACHINE

Abrasive Machine Tool Co., E. Providence, R. I., has announced its circular graduating machine for machine tool dials and hand wheels. Relatively small, and exceptionally simple to accurately operate, the circular graduating machine will graduate straight or angled surfaces with from 40 to 1,000 graduations with many combinations of length or line.



Abrasive Circular Graduating Machine

For more data circle **87** on Reader Service Card

★ ★ ★

DRILL PRESS ATTACHMENT

The Automator, an automatic feed device for drill presses up to ¾ inch, has been announced by the Diamond Tool Co., Dept. M-9, Box 32, South Haven, Mich. It provides automatic down feed and a new, instantly adjustable automatic depth stop and shut off. It also automatically applies lighter pressure at the end of the stroke to prevent burring. Regulated pressure prevents crowding and drill damage.

Simple to attach, adjust and operate, the attachment saves labor costs be-

the scale you can count on!
every shop needs one for counting small parts, estimating, or check weighing
AVAILABLE IN ALL WEIGHING STANDARDS
for further information write:
OHAUS
SCALE CORPORATION
1050 COMMERCE AVE.
UNION, NEW JERSEY

For more data circle **379** on Reader Service Card

MODEL 500 CONTACT WHEEL BELT GRINDER
The Fastest Known Method of Increasing Production
Rotates 360° and locks in any operating position desired.
WRITE FOR COMPLETE INFORMATION ON INCREASING YOUR PRODUCTION
B&E MFG. CO., INC.
2104 EAST 31 STREET
KANSAS CITY 9, MISSOURI

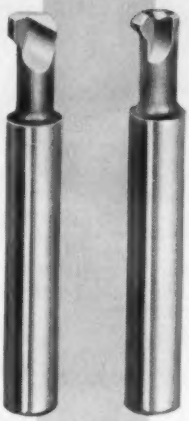
For more data circle **380** on Reader Service Card

SPECIAL JOBS with STANDARD TOOLS

Thread Recessing

Bokum produces standard tools designed to give perfect threads in blind holes. These tools allow a run over with your threading tool or tap in production to help insure a perfect thread to the full depth of the hole. Most thread sizes are available. Write for Catalog T-R.

TR-3



Back Chamfering

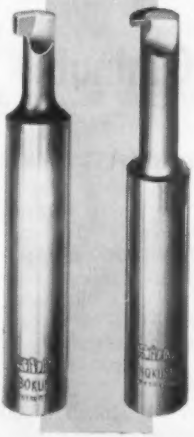
Here's another Bokum standard recessing tool. When you back chamfer a finished bore, you get a cleaner and easier cut off without a burr on the finished bored end of the part. Bokum produces these tools to conform to standard screw machine tool holder sizes. Write for Catalog B-CH.

B-CH-3

O-Ring Grooves

Bokum grooving tools produce the precise grooves needed for O-rings—meet the exact specifications of ring manufacturers. 15 different tools are available from stock for single O-rings, or for O-rings requiring one or two back ups. Larger diameters feature 2-piece construction. Write for Catalog O-R.

OR-103



Retaining Ring Grooves

Bokum produces a range of 29 tools to cut exact grooves for standard, inverted, bowed, beveled and self-locking retaining rings. 2-piece construction on larger diameters permits use of any length bar to compensate for the distance of the groove from the end of the work piece. Write for Catalog R-R.

RR-SV-46

All tools available high speed steel or carbide tipped. All are standard tools—for economy!

TRADE MARK REG. U. S. PAT. OFF.

BOKUM TOOL CO.

14775 Wildemere Ave.,
Detroit 38, Mich.

For more data circle **381** on Reader Service Card

View showing Diamond Automator Attachment

cause feed is automatic permitting operator to set up the next job or do other work during drilling operation. An electric switch shuts off the drill when the hole is completely through or when the stop is reached.

For more data circle **88** on Reader Service Card

★ ★ ★

FIRE RESISTANT HYDRAULIC FLUID

A fire resistant hydraulic fluid has been developed by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa., which has been compounded expressly for systems operating at temperatures above 150 degrees and for heavily loaded pumps and bearings. The fluid known as Houghto-Safe 1020 is a fortified synthetic material which provides greater film strength and lubricity and includes rust preventatives and anti-foaming agents.

For more data circle **89** on Reader Service Card

★ ★ ★ ★ ★

1500° in 5 minutes
2300° in 30 minutes

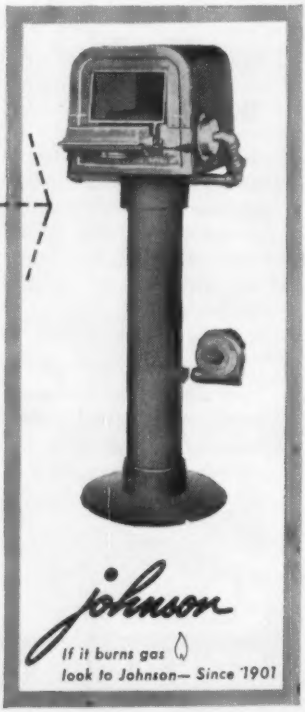
johnson NUMBER 120 HI-SPEED FURNACE

That's the kind of quick heating action you get with this compact, powerful furnace. It's economical to operate, too. Fast heat-up saves time and gas. High-temperature insulated firebox, 5" by 7¾" by 13½" gives even hardening of high speed and carbon steel dies, tools, and small parts. Temperature easily regulated. G.E. motor and Johnson Blower included. 120,000 BTU's per hour.

Pedestal style, F.O.B. Factory $167.00
No. 120 also available in bench style.

Write today for free Johnson catalog

JOHNSON GAS APPLIANCE COMPANY
571 E AVE., N.W., Cedar Rapids, Iowa



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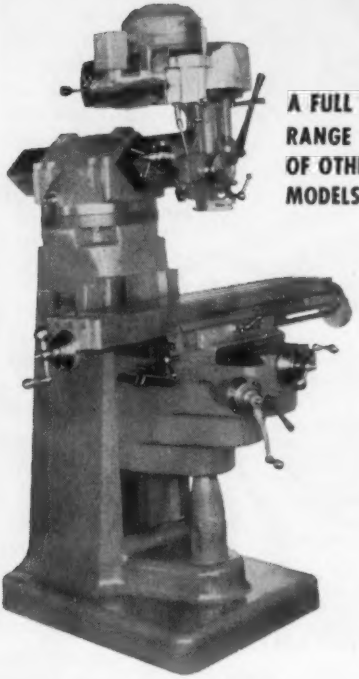
LIKE A "45" AUTOMATIC

—this NEW "45" INDEX MILL

has the "CALIBER" and "ACCURACY" to do your MILLING, DRILLING and BORING JOBS .. BETTER, FASTER AND MORE ECONOMICALLY!



A FULL RANGE OF OTHER MODELS.

The big caliber derives from the sliding overarm—The unique square design of this overarm gives much more rigidity with its resultant greater accuracy—It provides extra range and capacity—More usable working space—More versatility in set-up—More power at the cutter. No adjustment required on overarm and head after use, and no need to re-indicate head after moving overarm. Speed range with 9 changes makes possible the use of high speed or carbide tipped cutters to the best advantage. Many other important features.

Write for Literature.

INDEX MACHINE CO.

544 N. MECHANIC STREET JACKSON, MICHIGAN

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SCREW DRIVING CLUTCH

View showing Keller Screw Driving Clutch

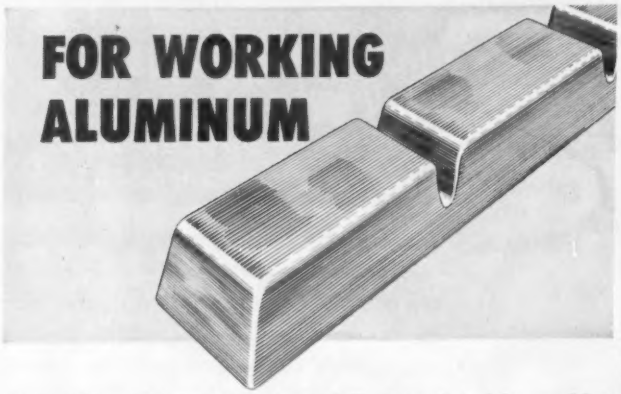
Keller Tool Division, Gardner-Denver Co., Grand Haven, Mich., has announced its "Safe-Torque" screw driving clutch for use with the company's air-powered screw drivers. The clutch gives accurate control of torque under a wide range of driving conditions from free running to gathering. It also delivers constant torque through a new principle of an overrunning roller drive.

The clutch is rated from 10 to 108 inch-pounds. It can be used for driving either right- or left-hand threaded fasteners. Adjustment for the torque delivered is made by turning a notched and knurled ring around the clutch body.

In operation, the clutch engages when forward pressure is applied to the fastener. The clutch kicks out when the preset torque is reached. Accuracy of torque delivered at kick-out is a function of the overrunning roller drive in which all contacting driving members roll on each other. The unit also helps prevent damage to screw heads, reduces driving time and helps lessen operator fatigue.

For more data circle **90** on Reader Service Card

FOR WORKING ALUMINUM



These Fiske Lubricants are especially formulated for working aluminum and aluminum alloys. They will enable you to produce clean aluminum products at lower cost.

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Die Casting	**231 Die Casting Compound**
Extruding	**514A Hot Die Lubricant**
Stamping	**Magic Compound**
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Let us know how you work aluminum and we will send you the bulletin that describes the Fiske Lubricant made for your industry.

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METAL WORKING LUBRICANTS

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(for the best Blanchard grinding results)

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This is our famous booklet *The Art of Blanchard Surface Grinding* — brought up-to-date with a third edition. It contains complete descriptions of our silicate, resinoid and vitrified bonded wheels. It also describes a number of jobs and shows you how to select the correct wheel for each job. Every Blanchard operator should have a copy handy — send for yours today.

Blanchard wheels are guaranteed for uniformity of grade. They're best for Blanchard grinders, best for every job. They give you maximum production, utmost economy . . . whether the work is tough as copper or fragile as glass, whether it requires heavy roughing cuts or precision grinding within .000010" of absolute flatness and surface finish of 1 micro-inch.

THE BLANCHARD MACHINE CO. MMS
64 State St., Cambridge 39, Mass.

Gentlemen:
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THE BLANCHARD MACHINE COMPANY

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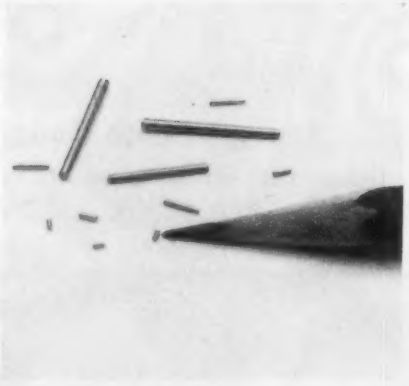
For more data circle **385** on Reader Service Card

new shop equipment . . .

PRECISION MINIATURE PINS

Miniature precision pins are now being made on a production basis by the Peaslee Metal Products Co., 470 Tolland St., East Hartford, Conn. The pins run from as small as 0.020 diameter by 1/16 inch long and are held to a 0.0002



View showing actual size of Peaslee Pins

limit on their diameter. Taper pins are made in the complete range down to 9/0. The pins are suitable in ordnance fire control equipment, electronic computers, guided missile controls, gyroscopes and office equipment.

For more data circle **91** on Reader Service Card

★ ★ ★

NEW DESIGN PIN-TYPE ARBOR

Precision machining of gears with involute splined bores is greatly facilitated by a pin-type arbor, developed by Scully-Jones and Co., 1909 S. Rockwell St., Chicago 8, Ill. This arbor is said to speed production by the unique and rapid method of loading, locking and unloading pieceparts. No arbor press is required to press the gear on

GETS-A-LITE GUARD and GUIDE

Quickly and Easily Installed by Anyone — No Tools Needed!

- Simply slip GETS-A-LITE GUARD AND GUIDE over the fixture, as illustrated.
- Made of indestructible spring steel wire. Nothing to unlock, fuss with or lock, when changing lamps.
- Maintenance man can change lamp in 10 seconds!
- Available for 40 watt and 100 watt fluorescent lamps.

GETS-A-LITE Company, Dept. MM-116
3865 N. Milwaukee Ave., Chicago 41, Ill.

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AIR GUN
Precision made of Bar Brass and Stainless Steel
Air-O-check
TRADE MARK
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No packing gland — no external levers or buttons. Easy to use. Unequalled for long service, dependability and low maintenance. Order sample on approval.
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Chicago 51, Illinois

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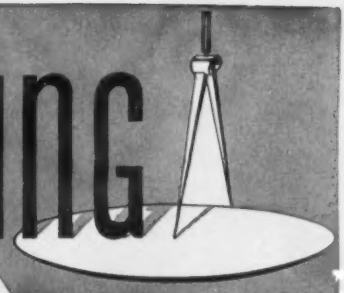
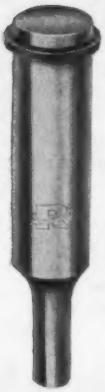
to economize

STANDARDIZE *with* RING



precision **PUNCHES** and **DIES**



Ring Standardized Punches and Dies offer cost saving dependable performance for all of your perforating problems.

Precision volume production to rigid specifications offers

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NEW! Tough — Accurate Retainers for Ring Punches and Dies mount easily to your die set. Available in Key Type for irregular shapes.

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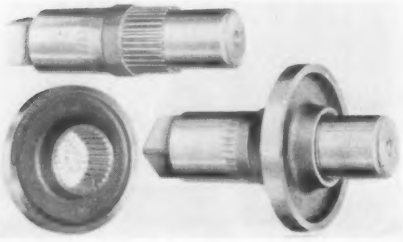

Scully-Jones Pin-Type Arbor for gears

and off the arbor and no nuts or wrenches are required for locking piecepart on arbor.

Improved quality of the finished gears is possible because the new arbor eliminates pitch line runout in subsequent gear cutting operations. Also, the face and sides of the gear blank will run square and true, due to the powerful precision hold generated by the arbor pins.

Operation of the pin-type arbor is extremely simple. The piecepart is loaded and the operator rotates it to actuate the arbor. This moves the pins up internal cams which force the pins into line contact with adjacent splines at, or near, the pitch line. The part is locked firmly to the arbor as the pins apply equal force all around the splined bore to eliminate play and improve accuracy. Thrust from turning and grinding operations keep piece from loosening. Pin-type arbors are special tools made to order for turning and grinding.

For more data circle **92** on Reader Service Card

You Can Rely on a **ROUSSELLE**

THESE 40-TON PRESSES

take job after job in stride and give you top speed and uniform output on a variety of work. They stress simplicity in every detail to achieve quicker set-ups, easier changeovers and simpler operation. All are extra rugged, high precision units, made to withstand hard usage and assure long, satisfactory service. They are *very moderately priced.*

Manufacturers of Rousselle Presses

Significant savings may result if you let our engineering staff assist you. There is no obligation.

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Choice of 25 models in 5 to 40-ton sizes.

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For more data circle **389** on Reader Service Card

no one has ever paid for service

There's never been a charge . . . never . . . for factory service on a Fulmer Honing Machine! And Fulmer Service is far more than an empty phrase. A company airplane is maintained to deliver service personnel and replacement parts, often in a matter of hours to meet an emergency. Fulmer machines offer the following added advantages:

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. . . for FULMER HONING MACHINES

Amazingly fast . . . stock removals up to 1¼ cu. in. per minute; geometrically accurate . . . surface finishes down to one micro inch, rms . . . identical finish from hole to hole . . . generous overload capacity, etc.

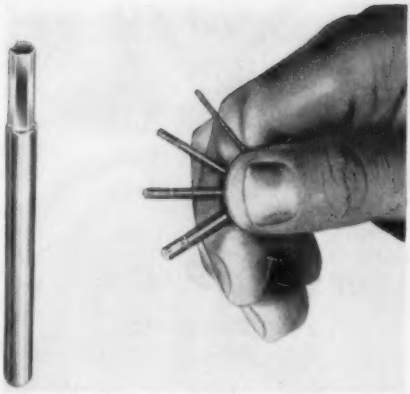
Fulmer precision honing machines can do for you what they are doing all over the world — save time and money! Write for Bulletin on Honing to: C. Allen Fulmer Co., Dept. "S" 107 E. 4th St., Cincinnati 2, O.

FULMER honing equipment

For more data circle 390 on Reader Service Card

STRIKE BROACHES FOR HEX SOCKET PRODUCTION

Woodruff & Stokes Co., Bldg. 32, 357 Lincoln St., Hingham, Mass., has designed a series of strike broaches that produce sharp, clean hex sockets in set or cap screws. These broaches are



View of Woodruff & Stokes Strike Broaches

made of specially heat-treated, high speed steel, and they are ground to a tolerance of 0.0005 inch across the flats. They permit fast production of small hex sockets. The strike broaches are available as standard tools, and are designed for set screw sizes ranging from No. 0 to ¼ inch.

For more data circle **93** on Reader Service Card

★ ★ ★

COMBINED DRILLS AND COUNTERSINKS

Quality Tool Works, 792 Market St., Waukegan, Ill., has announced a line of high speed combined drills and countersinks. These combination tools feature spiral flute design which gives

COLLIS COLLET EQUIPMENT

★ COLLIS Equipment fills today's important production needs so well because they are made by men skilled in making this type of equipment. Supply the proper unit from a complete range of types and sizes for Drill Sleeves and Sockets, Lathe Centers, Chuck Arbors, and Drill Drifts. We will handle your orders promptly.

THE COLLIS COMPANY
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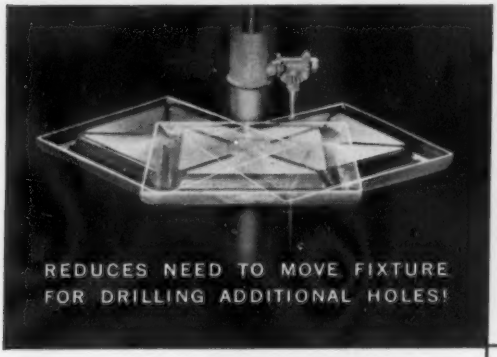
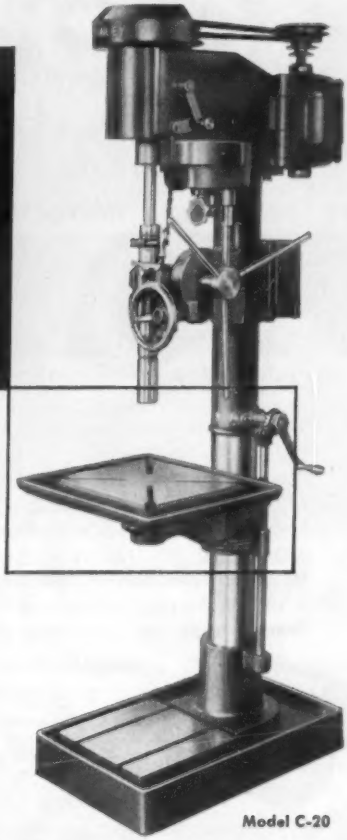
Sibley Table Swing Saves Set-up Time!





Model C-20

Lick largest cost item in toolroom, die shop—or small lot production! Rapid positioning by rotating table arm overcomes need to change set-up.

- Geared power feeds. Dial selection.
- Back gears for extra power.
- Drills 1¼" in steel plate.
- Accurate. Rugged. Convenient controls. Eight spindle speeds.
- Sensitive for "feel" of job.
- 20" swing. 2 h.p. motor.

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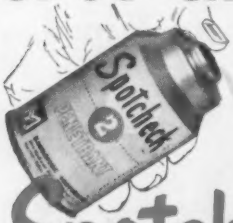
SPOT CRACKS with SPRAY ON Spotcheck®



DYE PENETRANT INSPECTION

Non-visible crack as detected on carbide tool.

- ✓ *CONVENIENT—EASY TO USE*
  Spotcheck—in pressurized spray cans.
- ✓ *DOES THE JOB EASIER*
  Detects cracks in tools, parts, machinery.
- ✓ *ENDS GUESSWORK ARGUMENTS*
  Positively spots cracks, not scratches.
- ✓ *NO OTHER EQUIPMENT NEEDED*
  No pumps, hoses, brushes, compressors.
- ✓ *PORTABLE—USE ANYWHERE*
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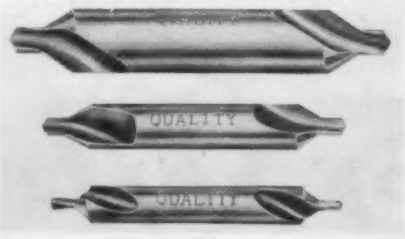
new shop equipment . . .



Quality Combined Drills and Countersinks

smoother cutting action and reduces breakage. They are available in either bell style or plain style. They are also available from stock in both the new and the old standard sizes. Special sizes made to order.

For more data circle **94** on Reader Service Card

★ ★ ★

DRILL PRESS VISE

Desmond-Stephan Mfg. Co., Urbana, Ohio, has announced its Simplex No. 3-DP drill press vise, designed for light-duty use. It has a full 3 inch jaw width and a full 3 inch jaw opening, with a jaw depth of 1½ inches and weight of 6 pounds. The overall length of 7-5/16 inches permits its use on small drill press tables.

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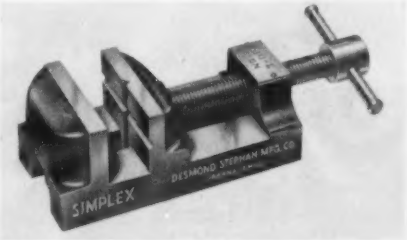
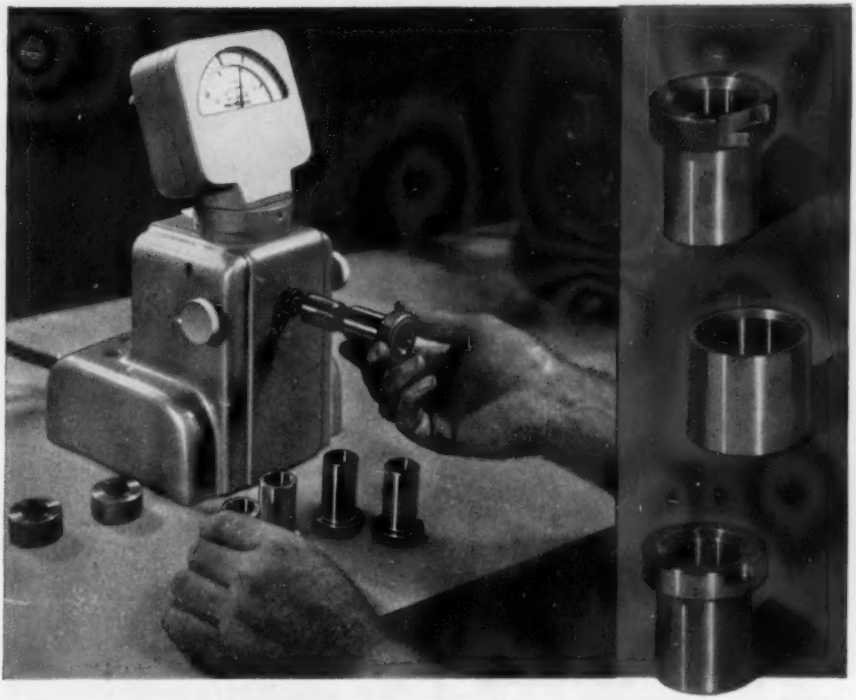


Desmond-Stephan Simplex Drill Press Vise



EX-CELL-O BUSHINGS LAST TWICE AS LONG

Customer's test proves there is a difference in bushings

New tests by major equipment manufacturer proved beyond doubt Ex-Cell-O Bushings last *twice as long as other bushings!* After drilling 16,300 holes, wear on other bushing brands averaged .0039"—ready for scrap! Wear on Ex-Cell-O Bushings averaged only .0017".

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Call your Ex-Cell-O Representative or write Ex-Cell-O, Detroit. You'll get same day shipment.

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

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MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

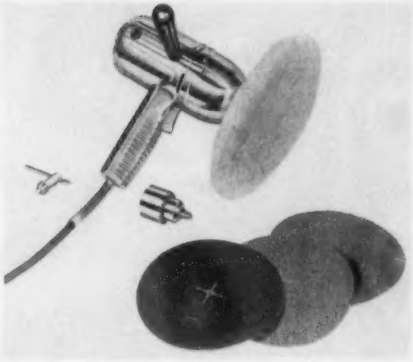
56-58

For more data circle 395 on Reader Service Card

POLISHING AND SANDING TOOLS

Thor Power Tool Co., Aurora, Ill., has recently added two new SpeedTools to its line. The Model 36 is a powerful, compact "car and home" SpeedPolisher equipped for both polishing and sanding. Weighing only 4½ pounds, it has a large offset handle and a removable side handle.

This tool is supplied complete with all necessary accessories for polishing and sanding, as well as a ⅜ inch geared chuck for drilling. It is also available in a kit which includes a wider assortment of basic accessories, plus drill bits, wire brush, paint stirrer, polishing powder and combination steel carrying case and wall rack.



Thor Model 36 SpeedPolisher, Model 35 Drill

Model 35 SpeedDrill has a ⅜-inch capacity in steel and a ¾-inch capacity in wood. It has a geared chuck and features ball bearing construction.

Additionally offered is the Model 35K SpeedDrill kit which has the same polishing and sanding attachments as Model 36, plus a bench mounting stand, drill bits, wire brush, cloth buffer, paint stirrer and combination carrying case and wall rack.

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CENTERLESS GRINDING

Brown & Sharpe and Swiss Automatic screw machine parts, aircraft and standard, heat treated and ground if necessary. Send blue prints for estimates. 27 years serving industry. The Porter Machine Co., Cincinnati 9, Ohio.

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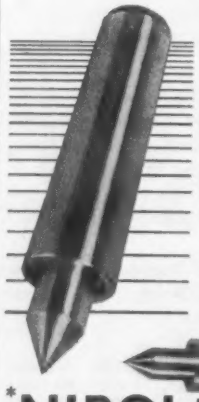
SPRING LOADED LIVE CENTER



Eliminate excessive overhang of your center. Use the accurate, rugged, reliable *NIROL. The spring loaded Live Center that compensates for expansion and contraction in actual operation.

Write for complete information.

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*NIROL MANUFACTURING COMPANY

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AND 10050 Porting Tools

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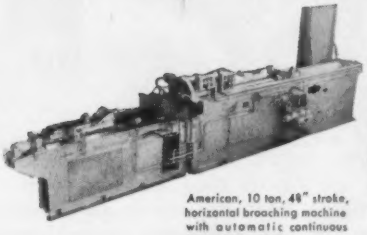
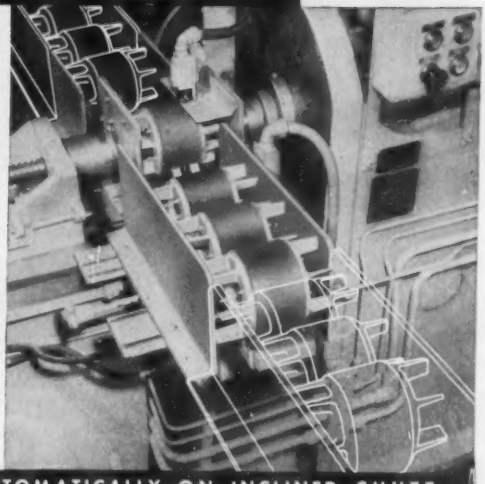
more about **AUTOMATION** by *American* ...

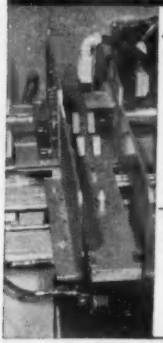
Broaching I.D. of rotors boosted to 200 PER HOUR

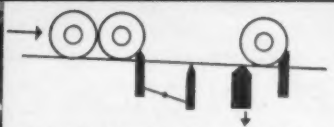


American, 10 ton, 48" stroke, horizontal broaching machine with automatic continuous broaching cycle.

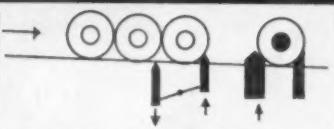


PARTS FED AND EJECTED AUTOMATICALLY ON INCLINED CHUTE

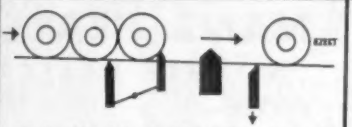




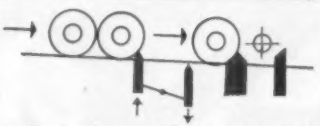
1 As cycle starts, split vee drops and part rolls into broaching position.



2 Broaching stroke begins. Retaining jack drops and second part rolls into hold position.

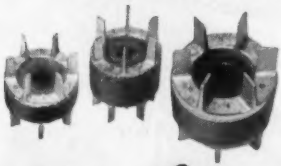


3 Broaching stroke completed. Split vee drops and part is ejected.



4 Broach carriage returns. Retaining jack drops and second part rolls against split vee.

MACHINE BROACHES DIFFERENT ROTOR SIZES



Thrust bushings on the clamping mechanisms seat in the I.D. of the rotors' fan sections. Simply by changing these bushings and adjusting the chute guides horizontally and/or vertically, rotors of varying diameters and thicknesses are broached on the same machine.

Whatever degree of automation is included in your production planning, if it involves broaching or machine assembly, American engineering can help you greatly. 'Phone or write us details.

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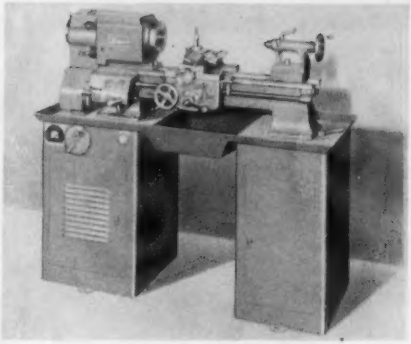
new shop equipment . . .

LATHE CABINETS REDESIGNED

Logan Engineering Co., 4901 W. Lawrence Ave., Chicago 30, Ill., has completed its restyling on Logan lathe cabinets and pedestal bases. This has resulted in making the 12, 11, and 10 inch swing cabinet and base lathes similar in appearance to the 14 inch swing lathe, pace setter of the line, according to the manufacturer.

Two styles of cabinets are available for the 12, 11 and 10 inch lathes. In one style, a single door opens to reveal three spacious storage compartments or shelves inside the right pedestal. The second style provides three separate pull-out drawers with individual locks. Both these pedestal base cabinet styles feature a wide and deep chip pan. The rigid, compact construction of these



View of Redesigned Logan 12" Swing Lathe

new bases saves floor space while providing an extremely sturdy and steady mounting for the heavily proportioned lathes. The trim, modern lines will enhance shop appearance and facilitate clean-up work.

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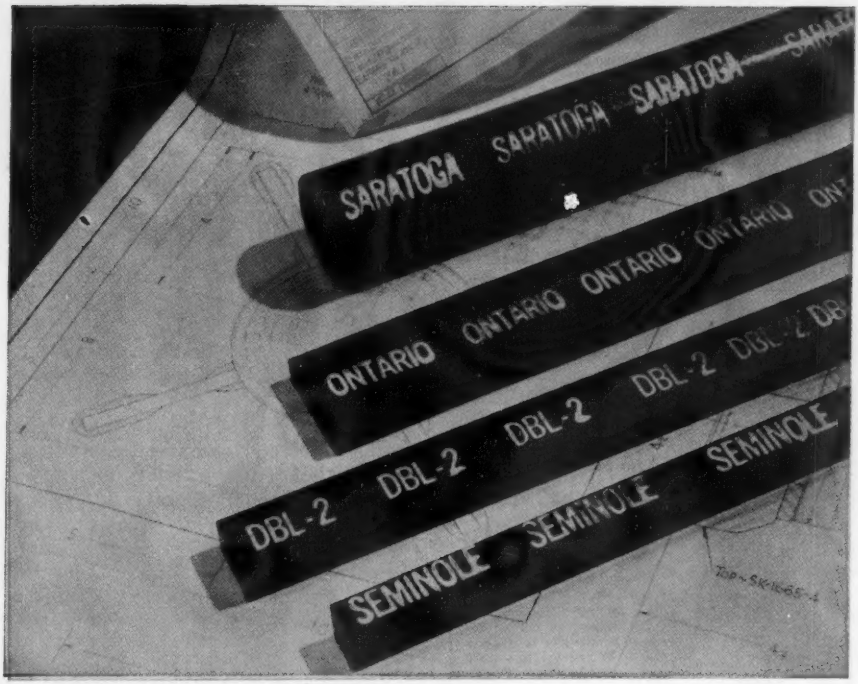

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"What's *that* piece?" . . . "Are you *sure?*" . . . In anybody's toolroom or stock racks, the best inventory or material identification system is apt to go haywire once in a while—and sometimes with grievous results.

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BLOCKS FOR RECEIVING HOOK AND SWING CLAMPS

Monroe Engineering Products, Inc., Monroe, Mich., has recently developed blocks to receive the company's hook and swing clamps. The blocks in turn are screwed to a simple base plate.

Illustration showing Monroe Engineering Blocks, top; Hook and Swing Clamps, bottom

According to the manufacturer, for years the clamps have been used in the construction of jigs and fixtures. Costly machine work was necessary to build a cast iron base plate or weldment and then machine the plate to receive the clamps. These blocks have been designed to eliminate this extra work.

For more data circle **98** on Reader Service Card

★ ★ ★

ADJUSTABLE VISE STOP

Glover Mfg. Co., 422 Park Ave., Meadville, Pa., has announced its adjustable vise stop. The vise makes it possible to machine many pieces rapidly, to the same dimensions after machine is set for the first piece. The manufacturer states that 0.0002 inch tolerances have been held on hole lo-

Handle your small part precision JIG BORING on the

LINLEY JIG BORER

Why tie up your big, costly jig borers on small work when you can get maximum utility at less cost per hour on a machine exactly fitted to your work. Put your small work on the LINLEY where it belongs and reserve your large machines for large work, where large work belongs. You'll save money this way.

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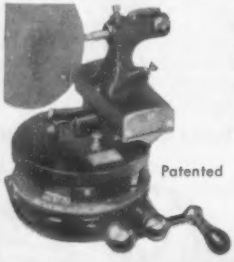

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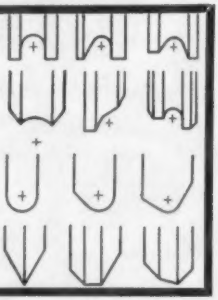

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Manchester Cut-Off Tool . . .

● New P.D.Q. "Manchester" cut-off tool offers *15 SECOND* tool change. Loosen only one screw to change carbide insert. "V" design on support blade and insert makes this tool self-centering and highly accurate. Adjustable rear stop provides positive insert backing and quick adjustment after insert is re-ground.

Tools are available for turret lathes, engine lathes, automatics and cut-off machines... Write for literature and specifications covering *ALL* the new "Manchester" tool features.

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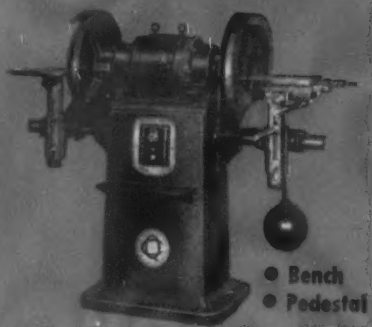
DISC GRINDERS
AND BUFFERS



QUEEN CITY Heavy Duty Disc Grinders and Buffers save you money when you buy and during every hour of use. Ruggedly designed, they feature special heavy duty bearings and motors. So good they're offered on a 30-day trial, yet priced 20 to 30% under competing makes.

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new shop equipment . . .

View showing Glover Adjustable Vise Stop

cation with this stop. One ¼-20 tapped hole will allow for the attaching of this stop to any vise.

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★ ★ ★

TAPE RULE WITH DECIMAL GRADUATIONS

A new tape rule, with decimal graduations in 10ths (0.10) and 50ths (0.02) inch, to meet the requirements of the electronics, automotive, aircraft and other industries is now available from The Lufkin Rule Co., Saginaw, Mich. The top edge of the blade is graduated in 10ths, and the bottom edge is graduated to 50ths for the first 12 inches, with the balance graduated to 10ths. The 50ths divisions are rapid reading; each fifth division numbered for faster, easier reading. The tape blade has an all-metal chrome clad finish and a self-adjusting end hook. It is furnished in a heavily plated steel case and in lengths of 6, 8, 10 and 12 feet.

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Lufkin Tape Rule calibrated in decimals

Chicago-Latrobe

High Speed Reamers

extra

with cutting mileage built in

Chicago-Latrobe High Speed Reamers are made as if they were intended to last forever . . . and they almost do. So next time order Chicago-Latrobe from your distributor . . . accept no substitutes. The extra life will save you money; the complete line assures service.

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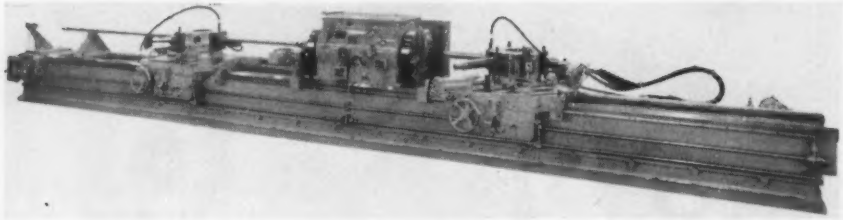

Lehman-Brandes Special Double and Hollow Spindle Lathe for profile boring and facing

SPECIAL DOUBLE AND HOLLOW SPINDLE LATHE

The Lehman-Brandes Machine Co., Chouteau and Grand Blvd., St. Louis 3, Mo., has designed and built a special double and hollow spindle lathe for profile boring and facing the precision front compressor shafts for J-57 jet engines, in one setting.

This machine is a heavy-duty 32 inch large hollow spindle lathe with a one-piece 38-foot bed with a carriage on both ends of the headstock. On each carriage is a 24 inch hexagon turret mounted on 45 degree roller bearing angular slides, both having independent Turchan followers with indexing template holders for the several profiles of the various boring bars.

The heavy carriages have a series of spring loaded rollers supporting the major part of the carriage weight and both carriages have power rapid traverse and have automatic length stops which disengage the apron feed handles.

With universal chucks on both ends of the spindle, complete machining of intricate profiles of the bore and facing of both ends is accomplished at one setting and in addition to the chucks on each end of the spindle, there is in the center of the spindle a hydraulically operated work support controlled by a small handle on the front of the headstock. This prevents deflection of the work between the two chucks.

A liberal flow of high pressure coolant is provided, carrying chips to a full length pan at rear of the lathe. Control of hydraulic driving clutches and hydraulic brakes is made at either carriage or at the headstock.

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Stops Losses
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Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.
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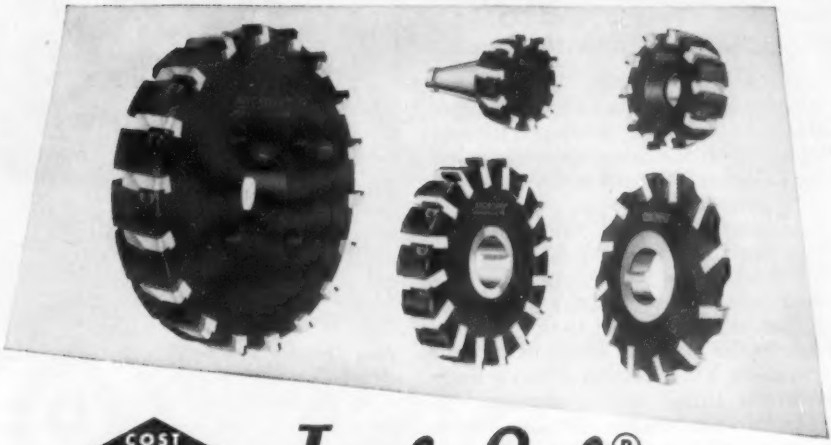
McCROSKY



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Jack-Lock® MILLING CUTTERS

featuring the nationally shop-proved *Jack-Lock*® Blade Locking Wedge

• McCrosky Milling Cutters combine the rigidity of solid tools with the longer life, greater economy, and lower cost of inserted blade design. They match the speed, feeds and power potential of modern milling machines. The powerful Jack-Lock wedges lock the blades rigidly and accurately in the body. No hammering or pounding on a drift. Blades can be locked while positioned against an indicator. Consequently a minimum of blade stock is lost in regrinding — reducing sharpening time and prolonging blade life. Get full details about the complete line! *Write for a bulletin today!*

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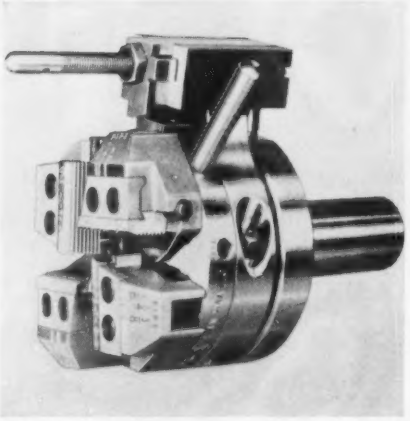
PRECISION TAPER THREADING HEAD FOR APPLICATION TO SMALL BAR AUTOMATICS

Landis Machine Co., Waynesboro, Pa., has announced its Landmatic taper attachment die head, developed for precision taper threading operations on No. 2 Brown & Sharpe and other small bar automatics.

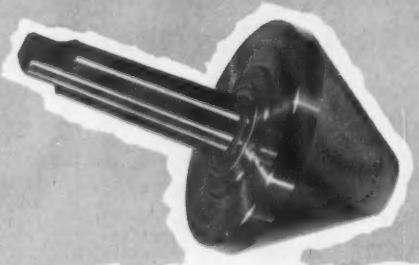
Compactly designed, this stationary type head has a ⅛ to ¾ inch pipe threading range. It is equipped with a taper attachment which expands the chasers at a rate equal to the required taper as the die head advances onto the workpiece. Thus, cutting action is limited to the throat section and first full tooth of each chaser. Cutting strains are reduced to a minimum and longer chaser life between grinds is obtained.



View showing Landis Taper Threading Head

Also, the use of a taper attachment enables longer than normal taper thread lengths. Of greater importance is the production of truly conical (no chaser

ROOFE HEAVY DUTY



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Guarantee Perfect Alignment

Two double rows of ball bearings in the large and small ends of this Bull Nose Center mean perfect alignment on any type of work.

Two shank sizes provide diameters from ½" to 7½" for a variety of work with a single center.

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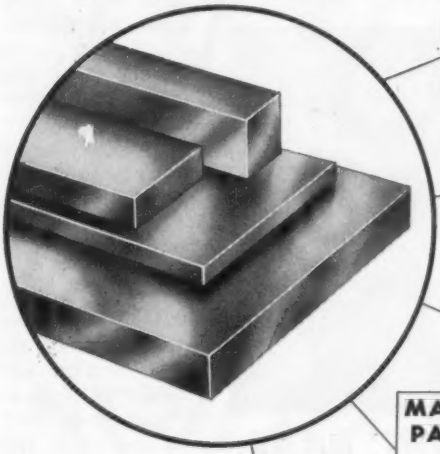
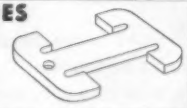


TEMPLATES

GAUGES



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leave-off marks), precision threads which will meet dry seal specifications.

An adjustable stop bar attached to the machine arrests the cam as the die head advances. The sliding movement of the cam slide along the cam allows the head to gradually open during threading at a uniform rate equal to that of the required taper. When the rearward travel of the cam slide enables its disengagement from the cam, the head fully opens. The cam slide returns to its forward position automatically as the head is closed.

A separate cam and cam slide are required for each taper. However, they can be used for all diameters requiring that degree of taper. Maximum thread length is limited to the length of the cam slide (¾ inch), but shorter lengths can be cut by adjusting the point of stop bar contact with the cam. Straight threads are produced by employing a straight cam and cam slide.

The head features an adjustable spring mechanism which allows compensation of the machine's cam lead for threads of different pitches. Through this device the head can be adjusted for the correct amount of pressure necessary for the pitch of thread to be cut. Another important feature of the Landmatic taper attachment die head is external tripping which prevents premature head opening due to rapid indexing of the turret.

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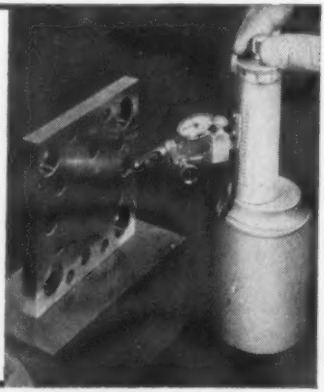
Micro-Height Gage reads faster than a micrometer! You measure from zero at base to 3". Hundredths on barrel... *thousandths* on big head that cuts reading time. Add dial indicator to quickly measure between holes, surfaces.



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Easy-reading Micro-Height measures and scribes faster than any vernier gage...with less chance of error! Risers give you ranges to 9". Accurate Micro-Height, finished in satin-chrome, quickly pays for itself!

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*Now they call Joe a genius**

* He's no Einstein — but he figured how to cut costs in half by switching to...

NEW T-J REAMERS

with *throw-away heads!*

You don't have to be a wizard at figures to see how the new T-J Reamer with Throw-Away Head cuts your replacement costs to *less than half.* You *save* because you replace *only* the part that wears out. Buy original shank . . . change the head in a jiffy when worn. Wide range of head sizes from ½" to 2¾" inclusive, in 1/16" increments available with right or left hand spiral flutes for thru or blind hole reaming.

Tapered hole in head insures concentricity and *new* thread design assures a snug fit on smoothly ground tapered shank. Reamer operates free from binding or sticking due to cutting portion wearing undersize and creating negative relief. It's a product of T-J's 39 years of know-how as one of the largest manufacturers of die sinking milling cutters. Tomkins-Johnson Co., 617 North Mechanic St., Jackson, Mich.

★Exclusive, high potential territories open to responsible manufacturers representatives. Write today!

1–Cuts replacement cost to less than half!
2–Quick change of heads saves time.
3–Wide range of sizes.
4–Head and arbor firmly locked together.
5–Easy to change heads for different metals, increases efficiency.

T-J **TOMKINS-JOHNSON**
RIVETORS · AIR AND HYDRAULIC CYLINDERS · CUTTERS · CLINCHORS

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COMBINATION FILTER, REGULATOR AND LUBRICATOR

Hannifin Corp., 565 S. Wolf Rd., Des Plaines, Ill., has introduced a new line of filters, regulators and lubricators known as the Crown Line. Design-

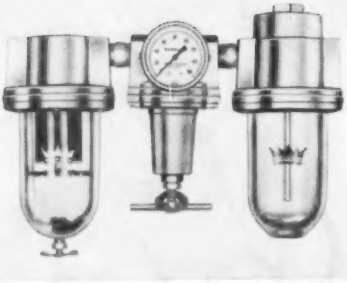

Illustration showing Hannifin Combination Filter, Regulator and Lubricator

ed for use in compressed air lines throughout industry, these units are of modern design and simplified construction, and offer many advantages to users of air cylinders, air presses and air tools.

With the ever increasing utilization of air-driven devices in industrial plants, it is said that users of compressed air will welcome the opportunity to effect real savings in air costs through the use of these newly designed units, which provide effective filtration, regulation and lubrication with a minimum of power loss. Because each unit accomplishes the purpose for which it was designed while providing minimum restrictions to the flow of air, the system provides maximum air flow capacity for their rated pipe sizes.

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TOOL ROOM ACCESSORIES
C. I. HAND WHEELS
Solid web in dished and straight types. Also counter-balanced. Fine grain cast iron. Rims and handles ground to high lustre. Many sizes. Low prices.
Also hand knobs, ball handles, machine handles, etc. High quality. Low prices.
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COUNTER BALANCED
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Magnetic Base Indicator holders
Stainless holding rod set in ball socket
Precision adjustment like surface gage
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Powerful 50 lb. pull base
CULLEN MFG. CO., RACINE, WIS.

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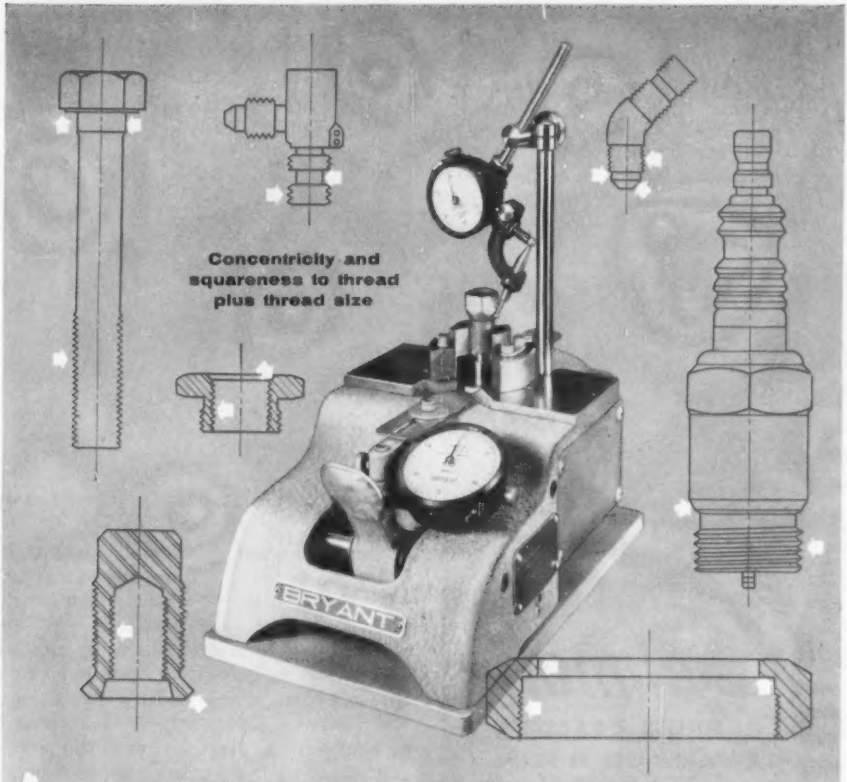

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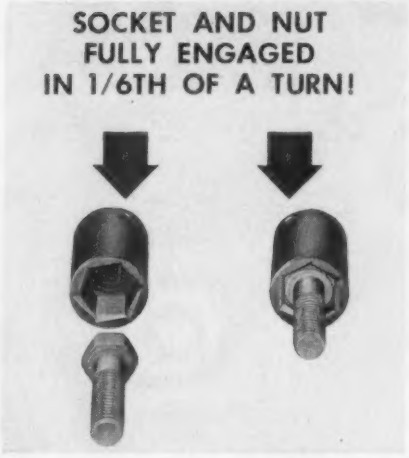
new shop equipment . . .

FAST LEAD IMPACT SOCKETS

To help meet the demand for automation in production fastening operations, The Apex Machine & Tool Co., 1027 S. Patterson Blvd., Dayton, Ohio, is now producing a new "fast lead" type of impact socket. A specially-designed broached opening allows the socket to fully engage the nut in 1/6th of a turn, almost instantly upon contact.

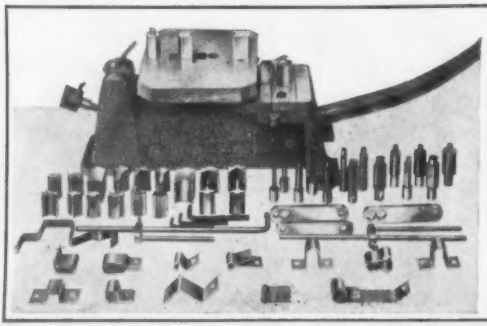


View of Apex "Fast Lead" type Impact Socket

Using these sockets, single or multiple power tools may be operated continuously, thereby speeding up the entire fastening operation. It is no longer necessary to start and stop the power tool for each operation, nor is it necessary to hesitate before the socket makes initial contact with the nut. They are available with hex broached openings ranging from 3/8 inch to 1 inch.

For more data circle **104** on Reader Service Card

For more data circle **417** on Reader Service Card



Multiform

BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL

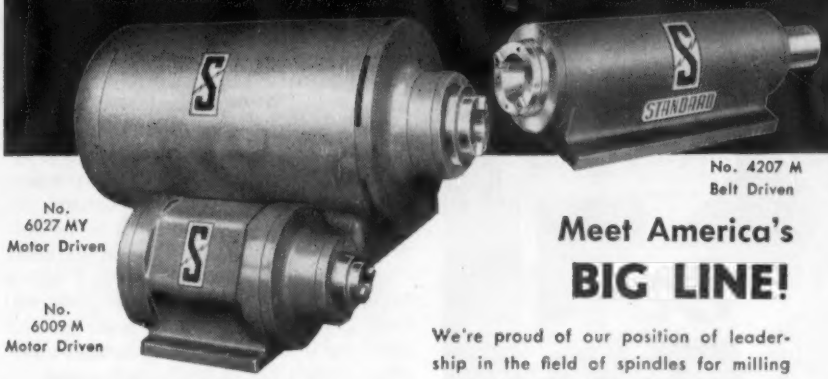
Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6-M Kalamazoo, Mich.

For more data circle **418** on Reader Service Card

STANDARD SETS THE PACE in MILLING SPINDLES



No. 4207 M
Belt Driven

No. 6027 MY
Motor Driven

No. 6009 M
Motor Driven

From 1 to 200 HP with standard tapers, #10 to #60. To satisfy every milling demand — enclosed, totally enclosed fan-cooled, high cycle and liquid-cooled. Motorized or Belt-Driven. Variable, single or multiple speed motor — Speed to suit your application.

Meet America's BIG LINE!

We're proud of our position of leadership in the field of spindles for milling applications — a leadership which is the result of nearly five decades of experience in the spindle field. For our customers, it means a milling spindle for every purpose — a complete line of master-crafted super-precision units with which the designer can meet the requirements of any milling job!

FOR COMPLETE SPECIFICATIONS AND DIMENSION DRAWINGS OF MORE THAN 75 MILLING SPINDLES, WRITE TODAY!

SUPER PRECISION SPINDLE DIVISION

SINCE 1912

the STANDARD electrical tool co.

SPINDLES AND MACHINE TOOLS

STANDARD Since 1912 HALLMARK OF METALWORKING THROUGHOUT THE WORLD

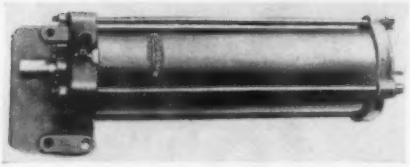
2487 RIVER ROAD • CINCINNATI 4, • OHIO

For more data circle **419** on Reader Service Card

new shop equipment . . .

COUNTERBALANCE CYLINDERS FOR PUNCH PRESSES

Dayton Rogers Mfg. Co., Minneapolis 7D, Minn., has announced an improved power press counterbalance cylinder design, known as the Model L. These cylinders have universal installation application to all power presses and can be installed in any one of four universal methods. The cylinders eliminate the ram drop or over-ride due to its own weight of the attached tools to the press ram. They also reduce punch press brake wear caused by excessive brake pressure.



Dayton Rogers Counterbalance Cylinder

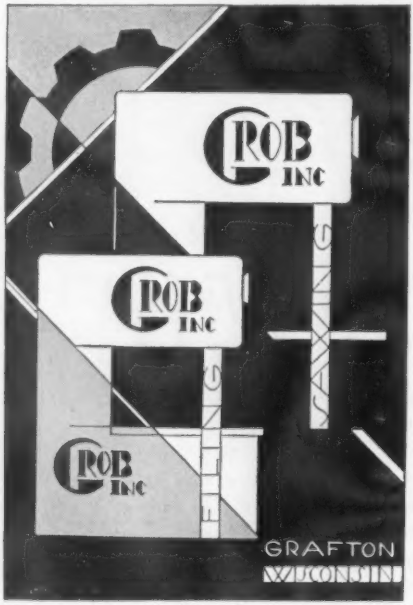
Snap-through or break-through is also eliminated. This is commonly referred to as ram back-lash, caused by punch break-through which is noticeable in blanking material like stainless steel, pre-tempered stock and other high tensile material. Once introduced, the cylinders will reduce wear on the machine to a minimum, assuring maximum clutch life of the punch press.

For more data circle **105** on Reader Service Card

★ ★ ★

CROSS-SLIDE TOOLHOLDER FOR MULTI-SPINDLE AUTOMATICS

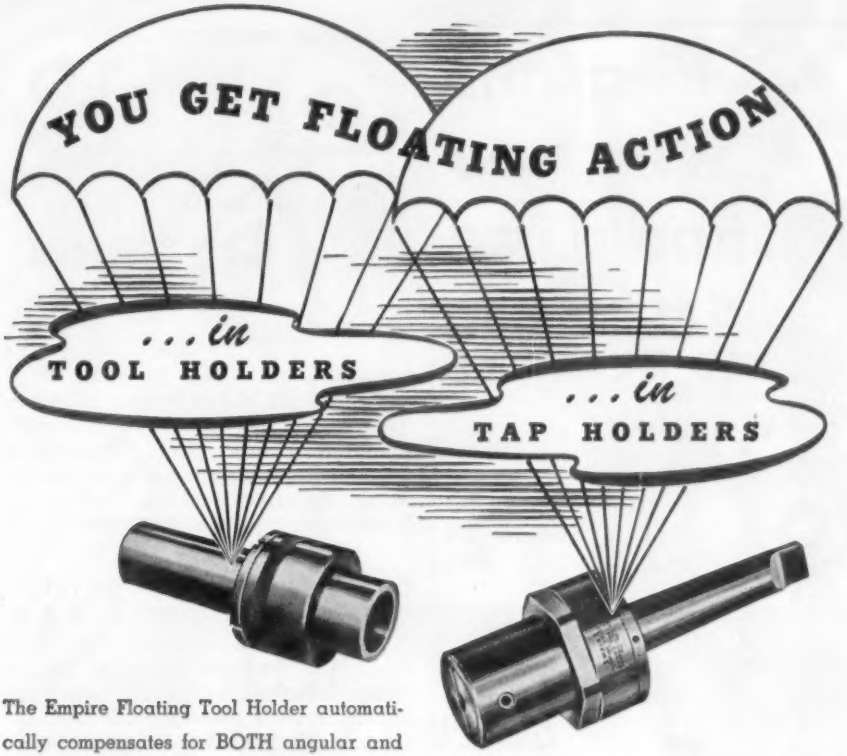
R and L Tools, 1825 Bristol St., Philadelphia 40, Pa., has added another member to its family of tools; namely,



For more data circle **420** on Reader Service Card

FOR FAST, ACCURATE TURNING AT LOWEST COSTS
NEW C & J 16" VARIABLE SPEED ENGINE AND TOOL ROOM LATHE MODEL VS
• Standard taper key drive spindle nose
• Heavy duty precision Timken taper bearings on spindle
• WRITE FOR BULLETIN A56VS
ALSO NEW
16" GEARED HEAD ENGINE LATHE MODEL GH
WRITE FOR BULLETIN A56GH
Speeds to 1500 rpm
Carroll - Jamieson Machine Tool Co.
BATAVIA, OHIO, U.S.A.

For more data circle **421** on Reader Service Card



The Empire Floating Tool Holder automatically compensates for BOTH angular and parallel misalignment. Sleeve and shank float independently of each other . . . achieving a free and easy movement . . . exclusive with Empire. Amount of float is infinitely adjustable. Minimum maintenance—holder has only five parts. Moving parts ride on rollers for smoother running with perfect alignment . . . and anti-friction of members. Bell mouths and over-sized holes eliminated, allowing for extremely close tolerance work.

Taps float IN and OUT with the Empire Floating Tap Holder. Designed to prevent freezing under tension caused by drag on the tap. Automatically corrects parallel and angular misalignment. Simple adjustment of locknut provides accurate control of wide range of float. Flotation makes close tolerances easy to hold. No spring or pivot members to restrict float. Available with straight or tapered shanks.

EMPIRE TOOL COMPANY

For more data circle 422 on Reader Service Card

4 Reasons why you should use GAMMONS DIE REAMERS

✔ Specially treated for today's modern die steels.

✔ Rapid cutting capacity.

✔ Tapers per inch .005, —.008, —.013 in stock.

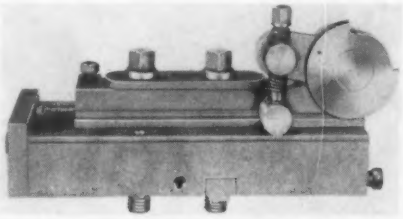
✔ Large range of standard sizes in stock at all times for your convenience.

WRITE FOR COMPLETE INFORMATION

GAMMONS • HOAGLUND CO.
MANCHESTER 2, CONN.
Manufacturers of helical taper pins, chucking, die makers and special reamers.

For more data circle **423** on Reader Service Card

new shop equipment . . .



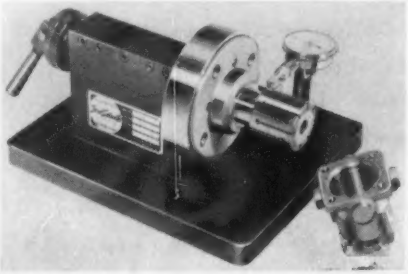
View of R and L Cross Slide Toolholder

a versatile toolholder for multi-spindle automatics. It can be used on either the front or rear cross slide of multi-spindle machines. Made for circular tools, the toolholder is made to operate within the capacity of the machine.
For more data circle **106** on Reader Service Card

★ ★ ★

COMPLETE INSPECTION FIXTURE

The N. A. Woodworth Co., 1300 E. Nine Mile Rd., Detroit 20, Mich., has released a complete inspection fixture comprised of all stock parts. Combined are the recently released Tork-Lok Collet Arbor and the Zero Spindle inspection fixture details. The result is a precision chucking tool for checking concentricity and squareness. A number of parts can be checked on one fixture through the interchangeable collet feature. Changeover is simple and quick.
For more data circle **107** on Reader Service Card



Woodworth Complete Inspection Fixture

in MILL HEADS

RUSNOK

Builds the BEST Quality at the BEST Price

¼ H.P. CONVERTICAL MILL HEAD

Only low cost mill head with quill travel attachment.
High speed medium-light operation.
For bench, floor and pedestal mills.
Fits milling machines with overarm 1½" to 3".
⅜" end mill capacity.

$245.00

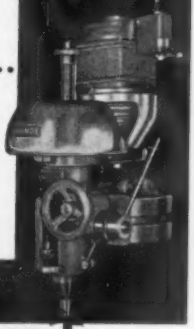
RUSNOK

½ H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
¾" end mill capacity.
For vertical, horizontal and angular operations.

1 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
¾" end mill capacity.
For vertical, horizontal and angular operations.



RUSNOK

RUSNOK TOOL WORKS
4840 West North Ave., Chicago 39, Ill.
DEALERS IN ALL PRINCIPAL CITIES

MILLING • DRILLING • BORING

For more data circle **424** on Reader Service Card

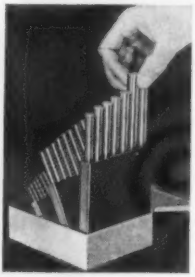
new shop equipment . . .

DRILL BLANKS PRODUCED IN 182 STANDARD STOCK SIZES

The availability of hardened high-speed steel drill blanks in 182 standard stock sizes, suitable for economical adaptation to an extended range of applications, has been announced by Ace Drill Corp., Adrian, Mich. Centerless ground from selected, uniformly heat-treated material, these blanks are claimed to be ideal for use as knock-out pins, punches, dowel pins, gages and rollers for high temperature applications. In addition, they are also quickly adaptable on the job to form a wide variety of end-cutting tools such as routers, countersinks, spot facers, end mills, tool blanks for boring bars, reamers and cutting teeth for use with inserted type milling cutters.

These high-speed steel drill blanks are also offered in four standard sets as follows: fractional sizes from 1/16 through ½ inch x 64ths; letter sizes from A to Z; wire sizes from 1 through 60; and wire sizes from 61 through 80. All four sets are stocked for immediate shipment and can be furnished with or without indexed cases, as desired.

Blanks up to ½ inch in diameter



Ace Hardened High-Speed Drill Blanks

Unique design of the two-dimensional Model D-2 features—Single micrometer adjustment controls vertical depth of cut, and adjusts height of copy table and pantograph.

Range of ratios from 2 to 1 to infinity!

Accessibility on three sides permitting panels up to 30" diameter to be engraved, milled or profiled. Vertical range over 10" allowing operations on complete chassis, cabinets or other bulky objects.

Ruggedness, stability and precise accuracy inherent in construction.

Mounted on the ruggedly constructed heavy duty steel Green Engraver Bench. All functional parts are conveniently within reach of the operator while seated. Accessibility of master type sets stored in lower cabinet trays, tools and accessories contribute to productive capacity.

A brochure with full details is yours upon request.

Literature also available on the smaller Model 106 three-dimensional engraver.

GREEN INSTRUMENT COMPANY
373 Putnam Ave., Cambridge, Mass.

For more data circle 425 on Reader Service Card

announcing the **new**

floating disc **MAXITORQ** *ELECTRIC CLUTCH*

For either WET or DRY operation

Completely original design . . . first and only clutch of its kind. Compact, simple, rugged, fully service-tested. Instant, positive action as clutch or brake. No drag in neutral. Electrical unit does NOT revolve with shaft, eliminating brushes. Easy installation, no adjustment.

Simple, practical and efficient . . . no electrical hazards . . . all parts enclosed. Uses standard Maxitorq performance-PROVED Floating Disc-Pac Clutch units. Single or double types in a full range of sizes. Patent applied for. For full information, write **Dept. MM-11.**

THE CARLYLE JOHNSON MACHINE COMPANY

MANCHESTER, CONNECTICUT

5CJ56

For more data circle **426** on Reader Service Card

are supplied in standard drill lengths with a tolerance of plus 0.0002, minus 0.0000 inch, while those over ½ through 1 inch in diameter are furnished in standard 6 inch lengths with a tolerance of plus 0.0005, minus 0.0000 inch. In addition, 36 lengths are also available from stock in standard diameters from 3/32 through ½ inch in step series of 1/32 inch and ground to a tolerance of plus or minus 0.001 inch.

For more data circle **108** on Reader Service Card

★ ★ ★

ADAPTERS FOR END MILLS

Heavy-duty adapters to accommodate a new series of 1½ inch shank diameter end mills for aluminum and its alloys have been introduced by Goddard & Goddard Co., Detroit 23, Mich. They are standard for No. 50 NS drive machines. Direct **front** - spindle **flange** mounting provides quick-change action by eliminating draw-in bolt. Four bolt holes and key slots make rigid mounting and positive drive. Two set screws firmly hold straight shank end mills. All locating surfaces are finish ground parallel and concentric for true mounting and accurate cutting.

For more data circle **109** on Reader Service Card

Goddard & Goddard End Mill Adapter

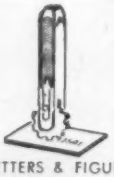
Symbol
of numbering
economy

NUMBERALL

SUPER QUALITY:

INDENTING NUMBERING HEADS

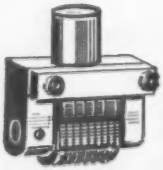
STEEL TYPE & TYPEHOLDERS



LETTERS & FIGURES ON ONE WHEEL

NUMBERING AND LETTERING PRESS

TYPEHOLDER & STEEL TYPE



MULTI-WHEEL HEAD FOR PRESS USE

MULTI-WHEEL HEAD FOR HAND USE

AUTOMATIC NUMBERING HEAD

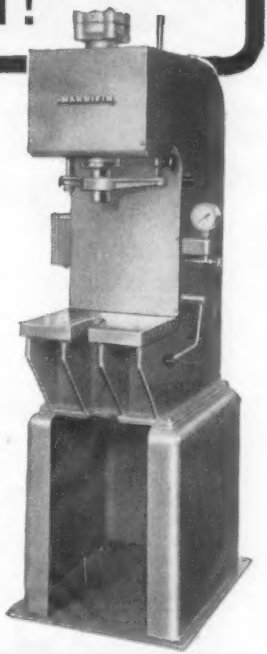
NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

For more data circle **427** on Reader Service Card

SEQUENCE TIMER-RECORDER FOR SPLIT-SECOND OPERATION CHECKING

Development of a new timing-recording instrument, called the "Monitorecord," specifically designed for split-second monitoring of multi-operational automatic machinery, has been announced by The Sheffield Corp., Dayton 1, Ohio. Up to fourteen or more operating sequences can be simultaneously timed to within one hundredth of a second and recorded on a strip chart for ready visual reference. According to the manufacturer, its portability (the instrument is about the size of a portable radio), rugged construction and no-ink operation all contribute to its efficiency. It can be quickly and simply connected to any electrical control circuit of today's automatic machinery,

"BEST $1425 WE EVER SPENT!"



That's the price of this 5-Ton HANNIFIN Press*

A lot of production men have made such comments about this versatile little hydraulic press.

They like the way you can adjust it to the exact force you need for each job, all the way from 1 ton to 5 tons. The backstroke is adjustable, too, so the ram just clears the work on any job. Fast-acting controls. Prompt delivery from stock.

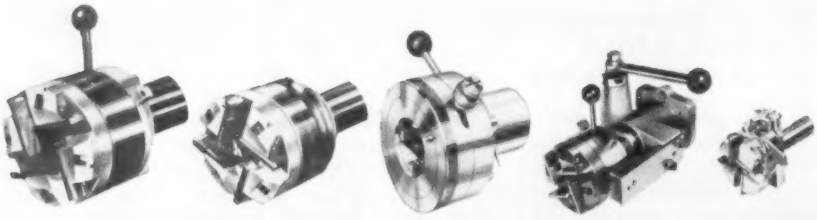
WRITE. Complete information and prices on the Hannifin line of 1- to 10-ton Hydraulic Presses will be sent on request.

*Price complete with motor and starter F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

HANNIFIN

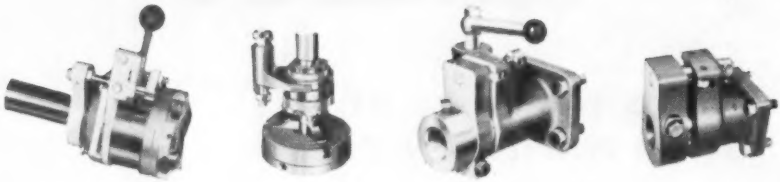
Hannifin Corporation, 565 S. Wolf Road, Des Plaines, Illinois

For more data circle 428 on Reader Service Card



DIE HEADS • Automatic opening tangent stationary and revolving types, tangent taper receding, radial stationary, hollow milling, B&S and small turret lathe types.

Jones & Lamson's thread



ACCESSORIES • External and internal trip attachments, drill press adapters, floating holders.

SHARPENING EQUIPMENT • Chaser sharpening machine, sharpening fixture, measuring gages.

Class III threads guaranteed . . . every time!

JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, 521 CLINTON ST., SPRINGFIELD, VT. U. S. A.

For more data circle **429** on Reader Service Card

Jones & Lamson recently purchased the Modern Tool Works, Rochester, N. Y. This acquisition greatly broadens J&L's service in the thread tool field, by integrating the products and designs of both companies.

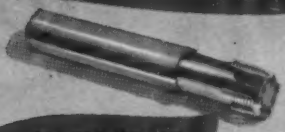
Now, J&L, operators of the world's most modern thread tool plant, offers you its own complete lines of die heads and chasers, accessories and sharpening equipment, plus a line of collapsible taps and chasers, solid adjustable taps and chasers, the Modern-Magic Chuck, and the Modern Stud Setter. Complete engineering service is also offered for the entire new combined line of products.

Send today for complete literature.

tool line now includes . . .

J&L MC COLLAPSIBLE TAPS

The same tap may be used on either stationary or rotating jobs. One complete tap, plus parts, gives you five sizes of taps ranging from 1 7/16" to 3 1/2".



J&L MS SOLID ADJUSTABLE TAPS

With ground-thread, precision chasers. Chasers can be removed from tap, reground and reset to cut to original size.

MODERN-MAGIC CHUCKS . . .

AND COLLET EQUIPMENT

Positive or adjustable friction drive for horizontal or vertical use. MODERN-MAGIC Quick Change Chucks and Collet Equipment virtually eliminate costly idle time of revolving spindles. Using these chucks, tools can be changed without stopping or even slowing the spindle. They give multiple spindle range to single-spindle machines. For instance: you can change collets as fast as you can index a turret.

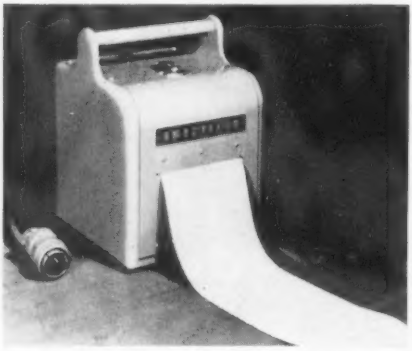
J&L STUD SETTERS

The new Style M Self-Opening Stud Setter's four-ball drive clutch gives more positive disengagement for more accurate stud heights.

MACHINE COMPANY

THREAD TOOL DIVISION

new shop equipment . . .



Sheffield "Monitorecord" Time-Recorder

enables production control and maintenance personnel to keep tabs on production by spotting faulty cycles, adjusting sequences for most efficient operation and preventing many costly slow-downs or shut-downs.

The device can be plugged into the electrical control circuit without shutting the machine down. No other external power supply is required. The start, stop and duration times of the various sequences are timed and recorded on a five-inch chart of pressure sensitive paper. A handy time scale of 0.2 seconds to the inch is marked on both sides of the chart with ample space between lines for making notations. It is accurate to within one hundredth of a second. It is said that the unit assures the proper relationship of automatic sequences and allows optimum timing for the most efficient machine, transfer, assembly, inspection, and other operations characteristic of today's automatic equipment.

For more data circle **110** on Reader Service Card

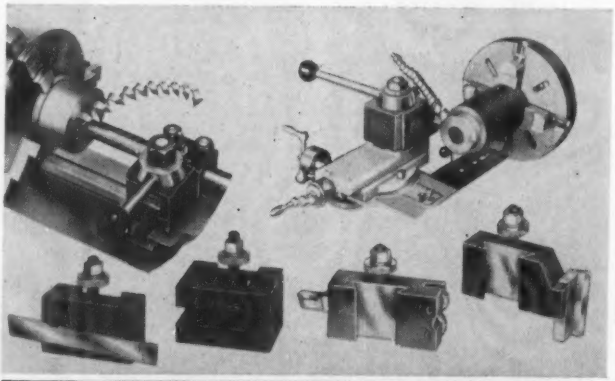
GET THE MAXIMUM FROM YOUR LATHES

by using the ALORIS "Quick Change" PATENTED TOOL POST and HOLDERS

Only a second to change tools for turning, facing, drilling, boring, threading, knurling, cutting off or any other operation.

- **GREAT REPETITIVE ACCURACY.**
- **RUGGED CONSTRUCTION.**
- **TESTED AND RECOMMENDED BY LEADING LATHE MANUFACTURERS.**
- **GREATER RIGIDITY.**
- **SAVES 90% IN SET-UP TIME.**
- **UNCONDITIONALLY GUARANTEED.**

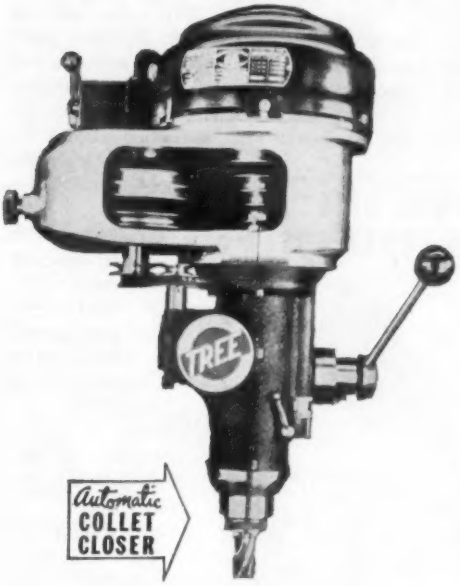
Write for catalog and price list.



ALORIS TOOL CO., INC. 131-37 SANFORD AVENUE FLUSHING 55, N. Y.

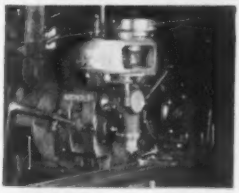
For more data circle **431** on Reader Service Card

do you need . . .
VERTICAL MILLING CAPACITY?

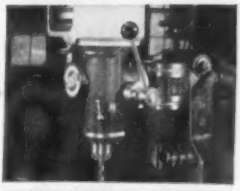


Cincinnati

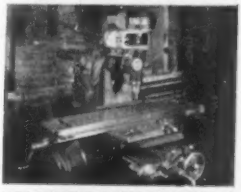
Nichols



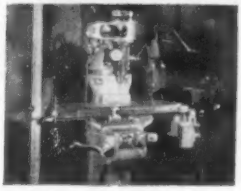
Kempsmith



Milwaukee



Bridgeport



You can add vertical milling capacity by adapting the versatile TREE MH-4 Vertical Milling Attachment to your present horizontal milling machine. The MH-4 gives you all angle milling, drilling and boring with a high degree of accuracy because of its built-in rigidity. Spindle — alloy steel, hardened and ground Roller drive eliminates back-lash. Quill — 4 inch travel. Enclosed micrometer depth stop. Power feed. Write today for full information.

EXPORT ADDRESS: States Trading Co., 401 Brdwy., New York 13, Cable Address; "STRADESO"

TREE TOOL AND DIE WORKS
1600 JUNCTION AVENUE RACINE, WISCONSIN

For more data circle **432** on Reader Service Card

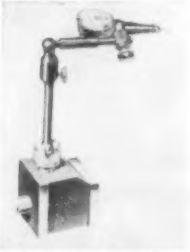
new shop equipment . . .

MAGNETIC BASE INDICATOR HOLDER

A magnetic base indicator holder has been developed by The L. S. Starrett Co., Athol, Mass., and is designed to simplify and speed up set-up, checking and inspection jobs requiring the use of dial indicators. A powerful permanent magnet type base holds firmly to any iron or steel surface in any position; horizontally, vertically or upside-down. A large-diameter push button turns the magnetic force on or off, making it possible to position and secure the base with one hand.

The base has a V-step across the top for mounting on curved surfaces such as horizontal or vertical arbors and chucks. A tapped hole on the side provides a second mounting position for the indicator post and also allows using two posts for multiple inspection work.

The magnetic base can be supplied with No. 657F indicator swivel post assembly which provides universal adjustment by means of a ball joint at the base and an upper friction joint. The latter has a fine adjusting screw for accurate final setting of the indicator. The assembly will hold either a No. 711 "Last Word" indicator or No. 196B universal dial test indicator.



Starrett No. 657 Magnetic Indicator Holder

MARKS METAL PARTS, TOOLS, DIES . . .
PERMANENTLY, FASTER, AT LOWER COST!

BURGESS
electric
VIBRO-GRAVER

USED IN HUNDREDS OF FACTORIES SHOPS LABORATORIES

WRITES LIKE A PENCIL ON HARDEST STEEL!

Now you can *write* code numbers, names, and other information on steel or other hard surfaces with Burgess Vibro-Graver! Save the time, expense, and lost motion of etching with acids, writing with crayon or pasting on decals. Engraves any hard surface (including glass) as easily as writing with a pencil on paper. No special skill needed . . . anyone can use it. All marks are *permanent* because they are engraved. Used everywhere in tool rooms, inspection departments, and on production lines for permanently marking parts, jigs, dies, tools, cutters.

VG-350 Kit with Vibro-Graver and Tantalum Carbide Point $9.95
V-77 Vibro-Tool (Heavier Duty) with Tantalum Carbide Point 11.50
V-80 Diamond Point for Continuous Work on Hardest Steel, Glass, etc. Fits Tools above 6.95

For Immediate Delivery or Further Details Write
BURGESS VIBROCRAFTERS, INC.
DEPT. A-54, GRAYSLAKE, ILLINOIS

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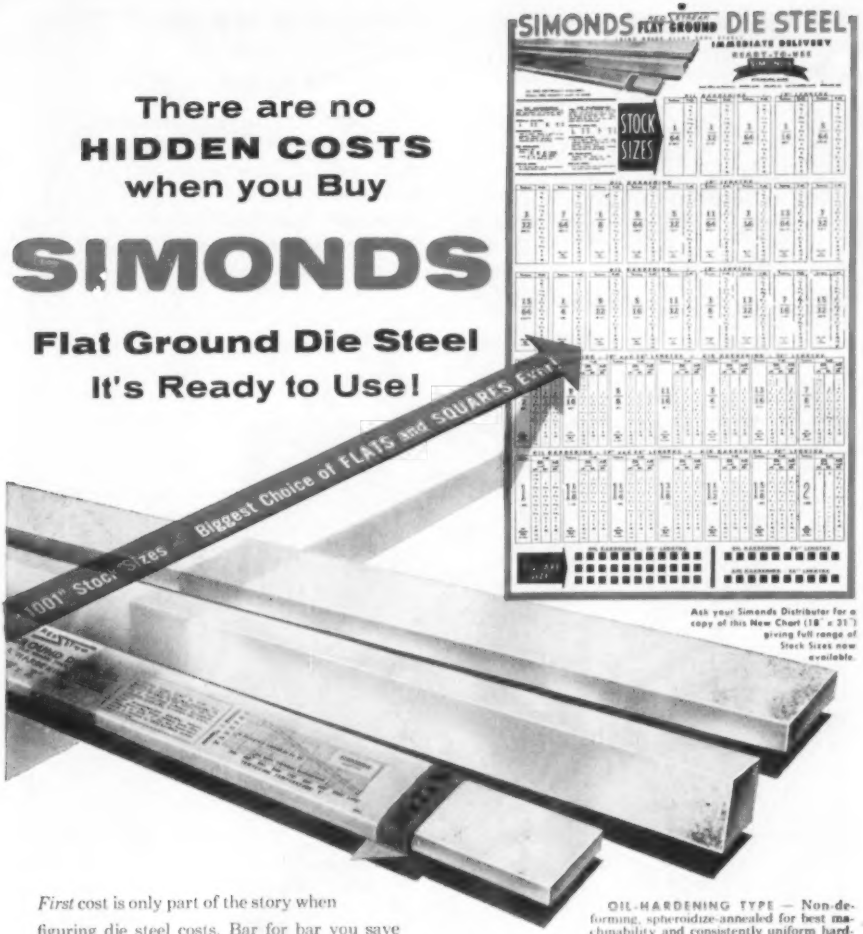
There are no
HIDDEN COSTS
when you Buy

SIMONDS

Flat Ground Die Steel
It's Ready to Use!


SIMONDS FLAT GROUND DIE STEEL
IMMEDIATE DELIVERY
STOCK SIZES
1001 Stock Sizes — Biggest Choice of FLATS and SQUARES Ever!

Ask your Simonds Distributor for a copy of this New Chart (18" x 31") giving full range of Stock Sizes now available.

First cost is only part of the story when figuring die steel costs. Bar for bar you save with Simonds. Simonds Flat Ground Die Steel requires no costly grinding to size. It's *already* precision ground to 1001 stock sizes. What's more it's uniformly annealed and readily machinable. You save on time. You get better results. have a choice of OIL Hardening or AIR Hardening type.

OIL-HARDENING TYPE — Non-deforming, spheroidize-annealed for best machinability and consistently uniform hardenability from Simonds' own steel mill. Extra-smooth finish with all decarburization and surface defects removed. Wide hardening range. Individually packaged (18" and 36" lengths) with simplified heat treating instructions.

AIR-HARDENING TYPE — Non-deforming, spheroidize-annealed, 5% chrome — more wear-resistant yet easy to machine and heat treat with uniformly excellent results. Another product of Simonds' steel mill. Extra-smooth finish with all decarburization and surface defects removed. Wide hardening range. 36" lengths. Individually packaged with heat treating instructions.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.

For Fast Service from Complete Stocks

Call your SIMONDS Industrial Supply DISTRIBUTOR

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que., Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.; Machine Tool Co., Newcomerstown, Ohio; Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada.

For more data circle **434** on Reader Service Card

The magnetic base can also be furnished with an upright base post, swivel post snug and gage holding rod for use with the company's No. 25 Series dial indicators. The base measures 1-15/16 inches high by 1⅝ inches by 1⅞ inches. The swivel post assembly is 6⅛ inches high.

For more data circle 111 on Reader Service Card

AUTOMATIC INTERNAL GRINDING MACHINE FEATURES VERTICAL DESIGN

Bryant Chucking Grinder Co., Springfield, Vt., has introduced a special vertical version of its Centalign automatic internal grinding machine. It is said that this machine, a vertical cam grinder, incorporates rigidity and stability; fast stock removal and accuracy. The workhead, wheelhead and longitudinal and cross slide motions of the wheelslide are in one common plane, in order to reduce deflections to a minimum and to insure permanent alignment. The manufacturer states that vibration absorbers incorporated in the fabricated bed, dampens all forces and assures fine finishes and consistent accuracy.

Machine function is controlled by programming cam sets which can be readily interchanged. A simplified servo-control hydraulic system combining the advantages of both cam and hydraulic machine operation gives accurate machine control and extremely smooth

NOW

FROM THIS CATALOG

NEW CARBIDE TOOLING PRECISION-MADE

Golden-Circle Rotary Tools

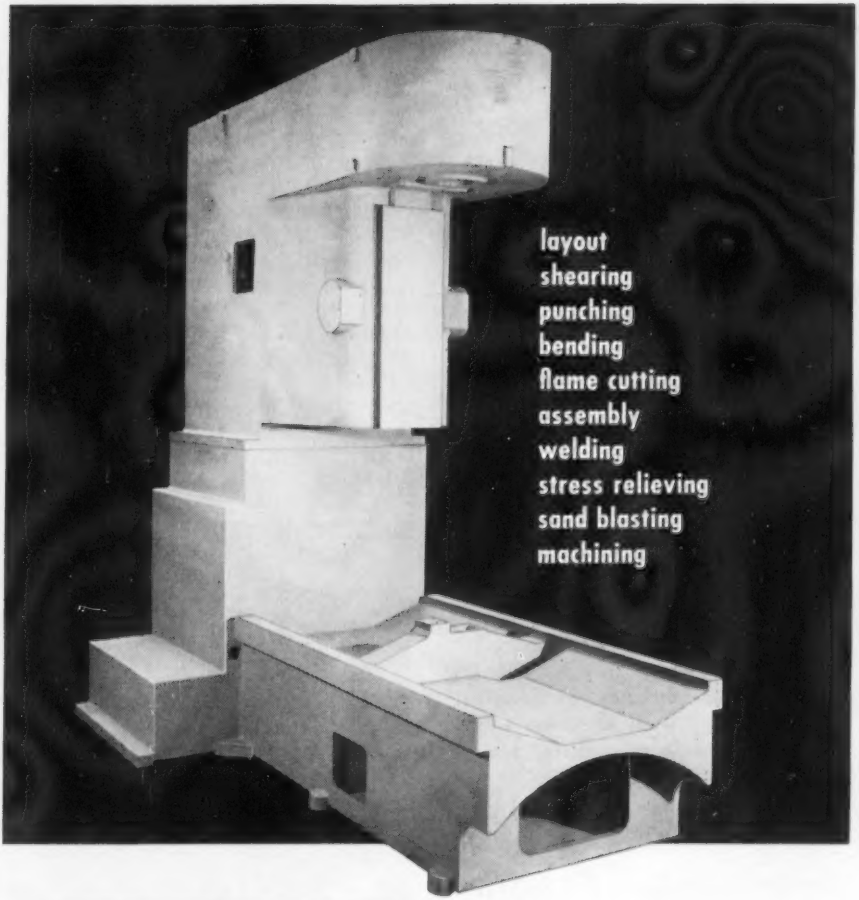
New! Elgin's expanded line of burs and rotary files, plus solid carbide end mills, all shapes and sizes precision-made. See how they can meet your requirements at lower cost! Write for your FREE copy of the new "Golden Circle" booklet today!

ABRASIVE DIVISION, DEPT. (P)

ELGIN NATIONAL WATCH COMPANY

Elgin, Illinois

For more data circle 435 on Reader Service Card



LITTLEFORD complete fabricating

Littleford's complete fabricating facilities free your plant and equipment for your own manufacturing specialty. It's like adding a new building--with 175,000 sq. ft. of floor space, equipped for all kinds of metal fabricating. You'll welcome this additional capacity that'll keep your assembly lines rolling. And you'll profit from Littleford's experience, particularly in fabricating machine bases, guards and pans. Why not send us your blueprints today for prompt and accurate estimates? Littleford Bros., Inc., 433 E. Pearl St., Cincinnati 2, Ohio.

For more data circle **436** on Reader Service Card

CHIPS DISSTON SAYS

"Be a Sharp Buyer!"

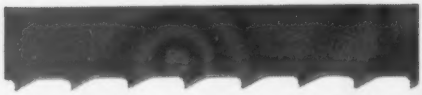
CHOOSE THE NEW

DISSTON

LANCER TOOTH

BAND SAW

for high-speed cutting of non-ferrous metals



LANCER TOOTH

Use this newly designed Disston hard edge blade with positive rake angle tooth. It permits high-speed production cutting of non-ferrous metal, wood and plastic—cuts brass and aluminum solids and Plexiglas with equal ease.

REGULAR TOOTH

Use this fine Disston hard edge flexible back band saw for all ferrous metals and the thinner sections of non-ferrous metal and plastic. Its finer tooth spacing is particularly adapted to sawing angle iron, steel tubing, nickel plate and brass sheets.

Contact your Disston distributor for these and other high quality Disston cutting tools. Get his expert advice on selecting the right tool for your application.

Henry DISSTON DIVISION

H. K. Porter Company, Inc.

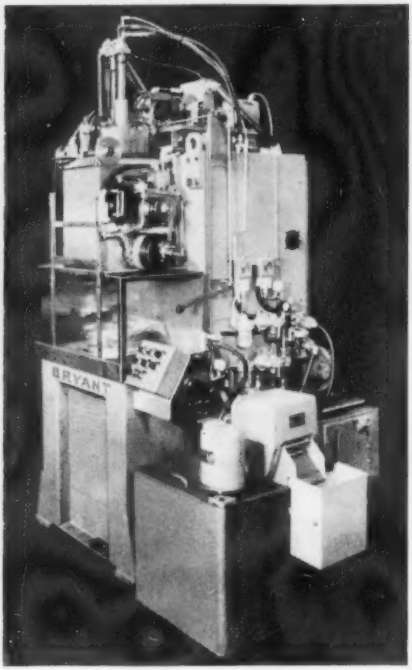
1121 Tacony, Philadelphia 35, Pa.

For more data circle 437 on Reader Service Card

operation. Typical of the uses of the vertical version of this machine is the grinding of 2-lobed bores in hydraulic pump parts at the rate of 130 to 140 pieces per hour. This compares with a production rate of 30 pieces per hour that was obtained by means of previous methods.

Work parts are hand-loaded into a special chuck, rotating at 100 r.p.m. This increased rotation rate is said to be one of the underlying reasons for the vertical Centalign's greater production capacity. Stock removal ranges from 0.015 inch to 0.020 inch.

For more data circle **112** on Reader Service Card



Vertical version of Bryant Centalign Grinder shown with guards removed

BUTTERFIELD

The Butterfield tools you buy more than meet the quality control standards set for your product.

- **Long Cutting Mileage**
- **Smoother Finishes**
- **Guaranteed Top Performance**

Use Your Local Butterfield Distributor To Your Advantage.

You get lower inventory costs, expert counsel and "hurry-up" service.

UNION TWIST DRILL COMPANY

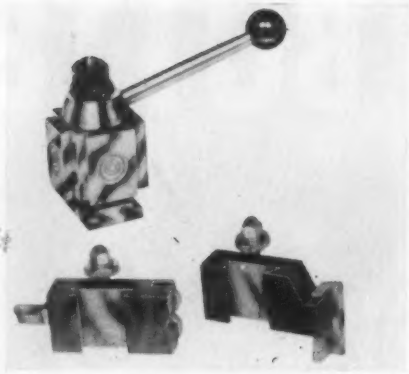
BUTTERFIELD DIVISION

DERBY LINE, VERMONT, U. S. A.

For more data circle **438** on Reader Service Card

THREADING AND COMBINATION TOOLHOLDERS

Aloris Tool Co., 131-37 Sanford Ave., Flushing 55, N. Y., has announced its threading holder, and a combination holder for knurling, facing and turning to be used with the company's Quick Change tool post. The threading holder is supplied with one 60 degree high-speed threading blade for standard thread cutting. It also has available blades for acme and square thread cutting. These toolholders and tool post enable the user to cut setup and running time considerably. When the user desires to change a tool, he merely flips the handle on the tool post, slides out the toolholder and then slips in the next tool. The handle is flipped back and the second tool is instantly and accurately aligned in the same preset-position. This combination is precision built to provide many years of accurate trouble-free operation.



View showing Aloris Tool Post and Holders

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KEO

CENTER REAMERS

•

HIGH SPEED STEEL

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3 FLUTES

Cuts from ¼" to 1". Furnished with 60, 82, 90, 100, 110 or 120 degree included angle. Large stocks on hand. Other angles are special. Let us quote.

Jobbers' Inquiries Invited

KEO CUTTERS

19326 Woodward - Detroit 3 Mich.

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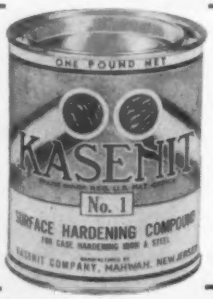


SPEEDY and SAFE

STEEL HARDENING

NON-POISONOUS • NO SPECIAL EQUIPMENT

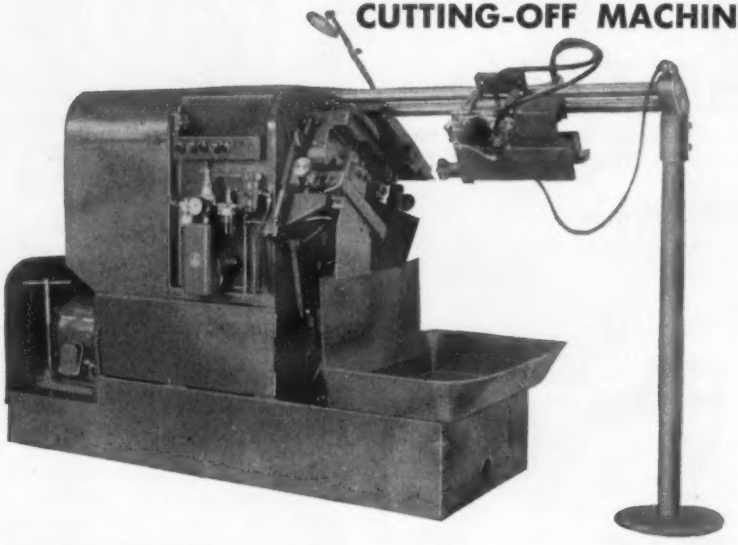
Indispensable for Machine Shops, Schools, Tool Rooms, Etc.
1 lb., 5 lb., 10 lb., 25 lb., 50 lb., 100 lb. containers.

KASENIT COMPANY

P. O. BOX 556 MAHWAH, NEW JERSEY

For more data circle **440** on Reader Service Card

THE MODERN AUTOMATIC
CUTTING-OFF MACHINE



Cuts Off Tubing, Pipe and Shafting . . . FAST

Cuts off longer pieces than a regular automatic machine. In fact, cuts off *any length you want*—and cuts it *faster*. If your production requires quantity cutting-off of tubing, pipe or shafting, check the figures below against your present time.

½" Tubing
This machine cuts off and chamfers both outside edges of ½" .030 wall tubing, 5" long at the rate of one every 2.5 seconds.

1 ¼" Cold Rolled
This machine cuts off and chamfers both ends of 1¼" cold rolled, 20" long, at the rate of one every 20 seconds.

1" Tubing
This machine cuts off and chamfers both outside edges of 3" long, at the rate of one every 3 seconds.

These popular, time saving machines are now available in four sizes, handling work up to 6¾" O.D. Their many cost cutting features are described and illustrated in our latest catalog that will be mailed promptly on request.

WRITE FOR ILLUSTRATED CATALOG

MODERN MACHINE TOOL CO.
Jackson, Michigan

For more data circle **441** on Reader Service Card

LIQUID CHILLER FOR COOLING LIQUIDS

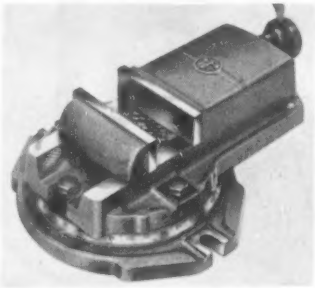
The Lundholm Mfg. Co., 1121 Charles St., East Rockford, Ill., has announced its combination air and water cooled electric refrigerated liquid chillers for cooling liquids such as coolants and hydraulic oils. The unit gives the industrial user a tandem system using water only as an auxiliary in excessive high production or extra hot weather.

Lundholm Air and Water Cooled Chiller

When operating under normal conditions only air is used as a cooling medium for dissipating heat. When pressures exceed beyond normal operation on the air cooled radiator, water enters the system relieving excessive high pressures automatically. As the pressure decreases the water is automatically shut off. This system is recommended in localities where water is scarce, or where the present drain systems are used to their near capacity and eliminates large reservoirs which take up expensive floor space. With proper balanced chillers, temperatures on coolants can be held to a given temperature all day long.

For more data circle **114** on Reader Service Card

PREWO PRECISION MACHINE VISES



- **UNDERDRAW CONSTRUCTION**
  No Lifting of Jaws • Faster Clamping
  Workpiece Held More Securely
- **HIGHER ACCURACY**
  Various Types: For Milling and Drilling Machines; also Quick Clamping Vise With and Without Swivel

Highest Precision Toolmakers' Universal Vises also available

NEISE MODERNTOOLS

KARL A. NEISE
404 4th Ave., Dept. MMS, New York 16, N. Y.

For more data circle **442** on Reader Service Card

for rapid threading

OF SCREW BLANKS AND SIMILAR PARTS

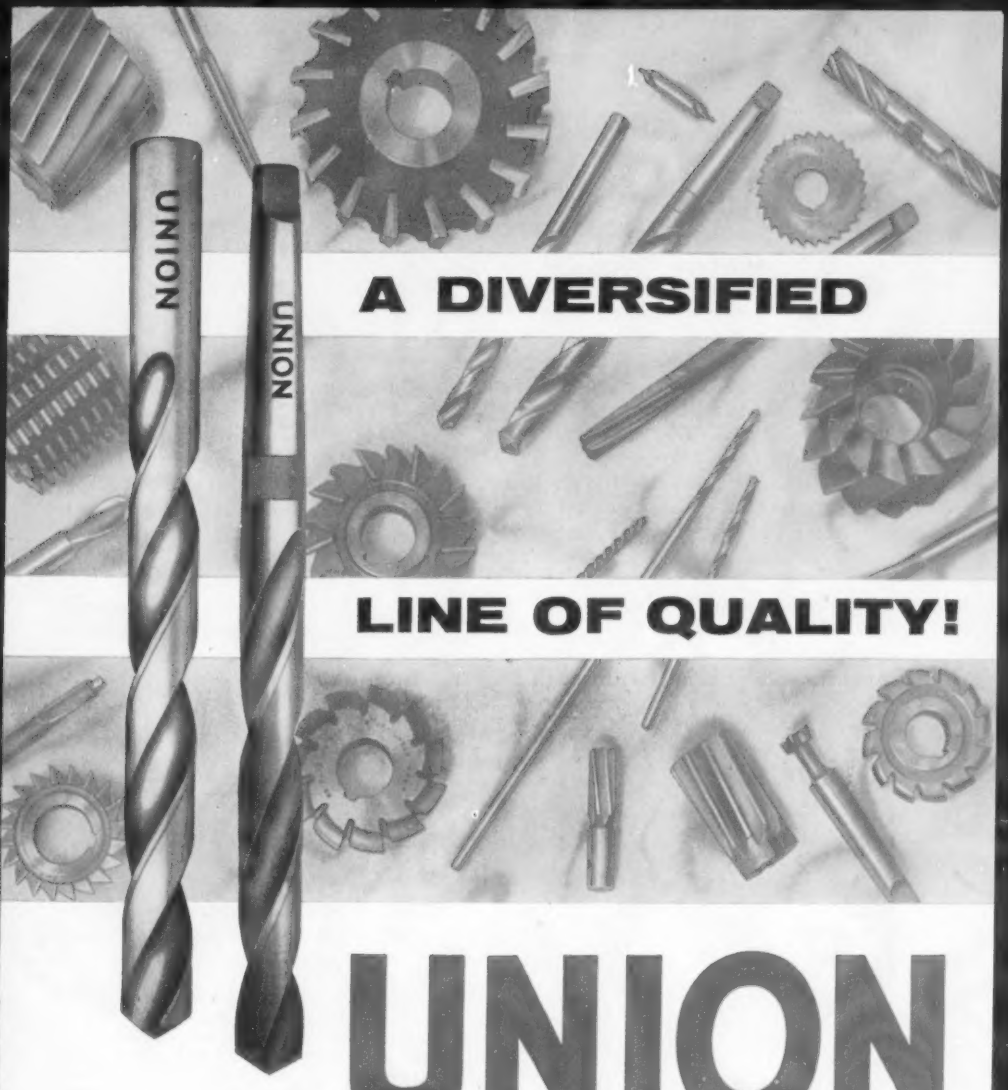
The KENT 2-Spindle BOLT THREADER

Alternate feeding to two spindles. Continuous operation. Large output. Low costs. Change-overs made quickly. Minimum skill required. Write for illustrated literature.

The KENT MACHINE CO., Cuyahoga Falls, Ohio

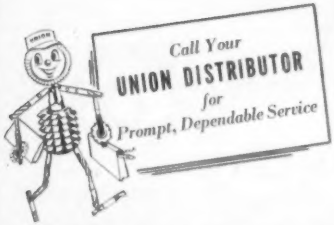
Drillers • Threaders • Slotters • Countersinkers • Bar Pointers

For more data circle **443** on Reader Service Card



A DIVERSIFIED LINE OF QUALITY!

UNION



In every drilling operation there's a particular drill that will do the job for you quickly, accurately and economically. Union offers a complete selection of top quality drills, standard and special, to suit the requirements of your job.

UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

Owners and Operators of: S. W. CARD DIVISION, Mansfield, Mass.
BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec

For more data circle **444** on Reader Service Card

POWER BENDING DEVICE

Kilham Engineering, Inc., Box 208-R.F.D., N. Attleboro, Mass., has announced the Curvit 145. This addition to its line of powered bending machines is made for forming circles or coils of tubing, flat or bar stock. The stock is formed by three geared rolls, some of which are contoured for tubing, while others are of a vee form that will take many solid shapes. The diameter of the circles is determined by the location of the third of the three geared forming rolls. The location of this is adjusted by means of a lever. Stops are provided so that the same diameter circles can be repeated. Power is supplied by a three phase motor with brake, and the power is transferred from this motor to the forming rolls through the medium of a V-belt drive and gear box.

View of Curvit 145 Power Bending Device

The maximum capacity of the Curvit 145 is 1 inch diameter steel tubing, which can be formed into an 8½ inch diameter circle. ⅛ x 1 inch hot roll steel can be formed edgewise into circles of the same diameter. Above the minimum diameter, which varies with the stock to be bent, any diameter circle can be formed.

For more data circle **115** on Reader Service Card

★ ★ ★ ★ ★

MULTIPLE DRILLING with a . . .

MULTI-DRILL

Increases Capacity Up to 800%
ADJUSTABLE TO ANY HOLE PATTERN
. . . FITS ANY DRILL PRESS

If your production requires drilling from 2 to 8 holes in a work piece, a MULTI-DRILL will cut costs and speed output up to 800%. The MULTI-DRILL is universally adjustable to any hole pattern—is compactly built to permit easy, unhampered operation with drill jigs or other special fixtures. Ruggedly built to take the wear and tear of high production work, the MULTI-DRILL will handle your long and short run multiple drilling jobs with ease and economy. The MULTI-DRILL will drill on hole centers as close as ½"—handle drill sizes up to ⅜" in steel. Special adaptations available.

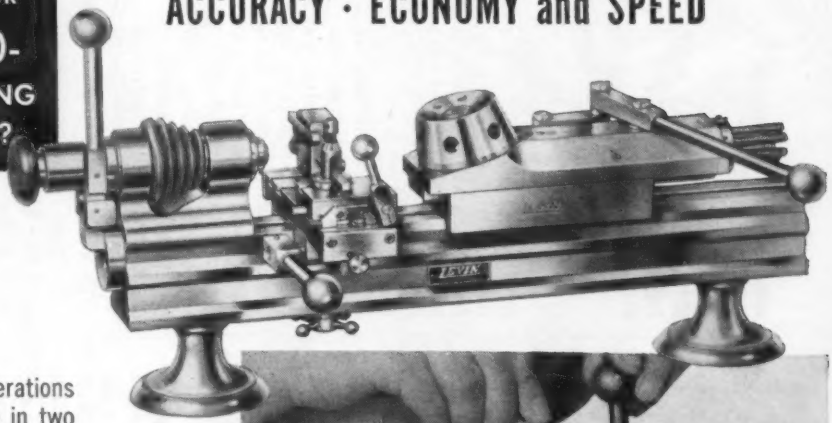
COMMANDER MFG. CO.
4224 WEST KINZIE ST. CHICAGO 24, ILL.

Product of *Commander* — Builder of Production Tools

For more data circle **445** on Reader Service Card

HOW **ANTIQUE** ARE YOUR MICRO-MACHINING METHODS?

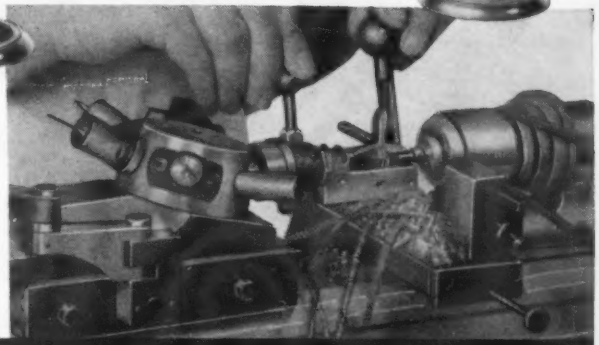
YOU CAN PRODUCE SMALL INSTRUMENT PARTS WITH MORE ACCURACY · ECONOMY and SPEED



LEVIN® TURRET LATHES

A small precision turret lathe for second operations and production of instrument parts. Available in two collet capacities, 5/16″ or 3/16″. The 6 position turret is self indexing and has hardened ways. Turret holes are 1/2″ diameter. Turret travel 1-5/8″. The cross slide has a swivel side at one end and a rigid tool block at the other. Lever collet closer provides quick opening and closing. A variety of turret tools with 1/2″ shanks is available.

Send for catalog M describing complete line of instrument lathes, micro-drilling equipment and accessories.



LOUIS LEVIN & SON, INC.—3610 S. BROADWAY—LOS ANGELES 7, CALIFORNIA

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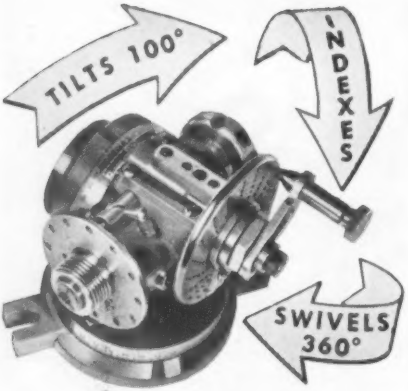


FOR FASTER PRODUCTION

THE **ELLIS**

DIVIDING HEAD

Although it is built to fine instrument standards, the ELLIS is a really *rugged* tool room or production tool that's designed for unusual versatility. Its universal motions — swiveling in two planes — will save time and increase profits and accuracy on your millers, grinders, drill presses and jig borers. It has 6½" swing, or 11" swing when used with riser blocks. Work may be held between centers, or in chucks or collets. To save rehandling of work, and to save money, investigate the ELLIS by writing for complete details!

NICHOLS MORRIS CORPORATION

76-H MAMARONECK AVE.
WHITE PLAINS, N. Y.

For more data circle **447** on Reader Service Card

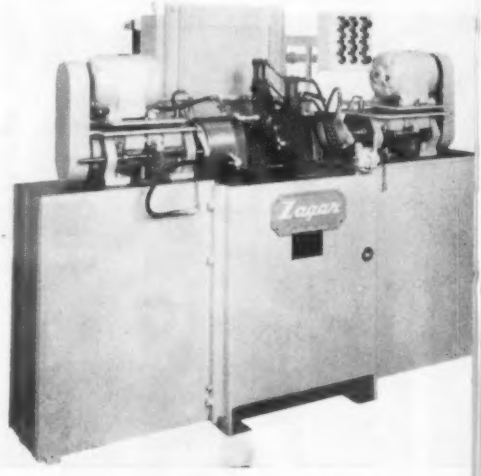
new shop equipment . . .

MULTIPLE SPINDLE MACHINE DRILLS VARIETY OF HOLE PATTERNS

Built by Zagar, Inc., 23898 Lakeland Blvd., Cleveland 23, Ohio, the machine shown herewith is equipped with two multiple spindle drill heads that allow for the drilling of screw holes in three revolver handles and a barrel holder in one pass. The change from one part to another is readily accomplished via the fixturing.

Each fixture holding the revolver handle is self-contained and can be inserted in the machine quickly. The drill heads, mounted on opposed feed units on either side of the workholding fixture, are rotated to the proper position of the specific handle being drilled. Automatic cycling, approach, feed and return movements of the machine are hydraulically controlled.

For more data circle **116** on Reader Service Card



Zagar Multiple Spindle Drilling Machine set up for drilling holes in revolver parts

INCREASES PRODUCTION...

LOWERS COSTS...

PAYS FOR ITSELF QUICKLY...

The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastics, and other materials—fast, accurately, and at very low cost. Only $110.00 Fixtures (illustrated) extra.*

*Motor equipment:—1/4 H.P. 110 Volt AC 60 cycle, single phase, swivel motor mount and light—$38.00**

**All prices FOB Chicago.*

★ **MILLS SMALL PARTS MUCH FASTER.**

★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.

★ **INEXPERIENCED HELP CAN OPERATE IT.** Safe, simple, fool-proof operation.

★ **NO MORE COSTLY SET-UP TIME. $110.00*** price so low that it pays to keep one or more Hand Millers always set-up for special operations.

★ **YOU GET A BETTER PRODUCT**—the result of ABSOLUTE ACCURACY.

★ **A LOSS BECOMES A PROFIT** when marginal pieces are finished on the Hand Miller instead of on high cost equipment.

★ **VERY LOW MAINTENANCE.**

★ **USED REGULARLY IN 1163 MANUFACTURING PLANTS** (some of which use as many as 30 machines)—yet on the market a scant few years.

★ **UNIQUE—VERSATILE.** Nothing else like it. One or several machines can be the answer to some of *your* production problems.

Write today for further information.

H. B. ROUSE & COMPANY
2214 N. WAYNE AVE., CHICAGO 14
50 YEARS OF SERVICE TO INDUSTRY

For more data circle **448** on Reader Service Card

CLAMPING ASSEMBLY

A simple and inexpensive clamping device that increases production through reduction of set-up time in work-holding operations has been produced and marketed by Morton Machine Works, P.O. Box 231, Millersburg, Pa. Called Jig-Nut, it is a twin-cam activated unit that can be easily attached to any fixture clamp stud or T-slot bolt without requiring special fittings, air or hydraulic pressure lines. It permits the operator to apply or release up to 5,000 pounds with a flip of the wrist.

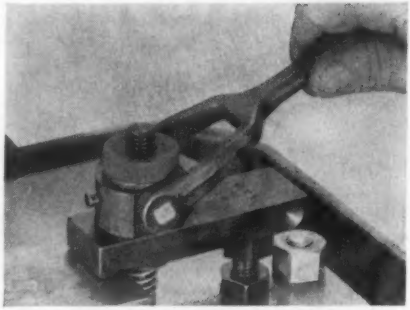


Illustration showing Morton Jig-Nut Assembly

Replacing hex-nuts and washers, acorn-nuts in clamping assemblies, the device obsoletes wrench hand tightening because easy adjustability to any desired clamping pressure is obtained by simple finger manipulation of a knurled nut. This activated assembly gives the operator a locking factor which can be applied in any position throughout a full 360 degrees of handle rotation. In locked position, the clamping assembly is shake and vibration-proof, a most important factor where the workpiece is subjected to intermittent cuts.

For more data circle **117** on Reader Service Card

BRUSH TOP CANS
For Layout Blue!

HANDY, ELLISCO BRUSH TOP CANS MAKE IT EASIER FOR YOU TO APPLY AND STORE LAYOUT BLUE. BRUSH KEEPS MOIST IN CAN. CONTENTS WON'T DRY OUT 3 OZ. TO 1 QT. CAPACITIES. GET DETAILS AND BULLETIN NO. 60A.

George D. Ellis & Sons, Inc.
4024 N. American St., Philadelphia 40, Pa.

For more data circle **449** on Reader Service Card

"PAK-N-STAK"
COPYRIGHT
The most economical LEAKPROOF, LIGHTWEIGHT, DRAWN TOTE PAN *offered to industry*

OUTSIDE DIMENSIONS
DEEP — 5½"
LONG — 18¼"
WIDE — 10 15/16"

There Are 25 Nested Tote Pans in Above Photo
WRITE FOR CATALOG AND PRICE

BATHEY MFG. CO.
100 SO. MILL ST. PLYMOUTH, MICH.

For more data circle **450** on Reader Service Card

BORE small HOLES?
Use *Comet.* **Boring Tools**
(H. S. S. and Carbide)
for Holes from 1/16" Upward
STANDARD AND SPECIAL BORING, FACING & INTERNAL THREADING TOOLS
Write for Complete Data

COMET Tool Co. 738-MM BROADWAY, NEW YORK 3, N. Y.

For more data circle **451** on Reader Service Card

NOW BETTER GROUND FINISHES!

with J&S guaranteed self-adjusting live centers*

ACCURACY .0001"
OR LESS
FOR LATHES, GRINDERS
PERFECTION LIVE CENTERS
SPINDLE TYPE
*GUARANTEED 2000 HOURS OR 1 YEAR

SIMPLE DESIGN:
Only six parts. One-piece main body serves as cup for roller bearing on which spindle turns. Allows much greater capacity bearing in same size body.

AUTOMATICALLY ADJUSTS FOR WEAR:
End thrust from work keeps tapered roller bearing perfectly seated—bearing cone and inner race of ball bearing are pressed on spindle; outer race is a light press fit into main body.

ABSOLUTE CONCENTRICITY AND ALIGNMENT FOR BEARINGS:
Both conical and cylindrical bores of body are ground at same setting in work head. Point is ground under load in its own bearings to insure running dead true.

TAPERS AVAILABLE				
MORSE	JARNO	B & S	NORTON	LANDIS
2 to 7	6 to 20	7 to 18	10 to 24	.8125 1.3350 1.7500
SPECIAL POINTS, HEADS, SHANKS AND TAPERS MADE TO ORDER				

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See your industrial distributor or write for free literature.

WHEEL DRESSERS — J&S TOOL CO. INC. — JAW CLAMPS • PRECISION VISES • DOWN-HOLDING DEVICES — **CLAMPCUT** — SINE BARS

J & S TOOL CO., INC. | **871 DORSA AVE.**
LIVINGSTON, NEW JERSEY

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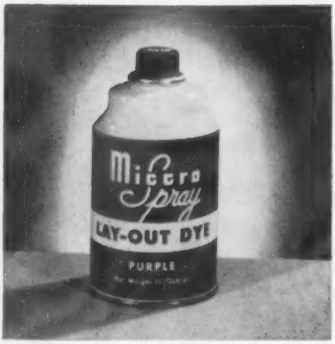


Miccro Spray

LAY-OUT DYE

(Purple)

MICCRO Lay-Out Dye, long the leader in its field, now available in an AEROSOL package for SPRAYING.

All the advantages—instant drying; clear, sharp lines—*plus* easy-to-use, dependable, efficient MICCRO Spray container.

•

Regular MICCRO Supreme Lay-Out and Identification Dye in seven distinctive colors available as always in brush-in-cap and conventional containers.

Write for circular on company letterhead

MICHIGAN CHROME & CHEMICAL COMPANY

8615 Grinnell Ave., Detroit 13, Mich.

For more data circle **453** on Reader Service Card

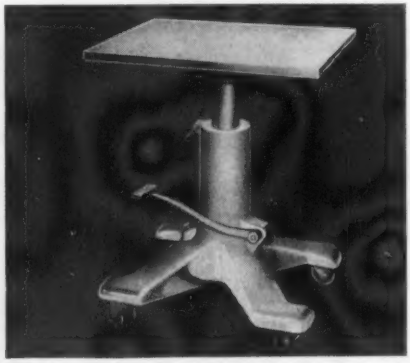
new shop equipment . . .

ONE-TON HYDRAULIC ELEVATING TABLE

Midwest Tool and Engineering Company, Dayton, Ohio, has announced a foot actuated hydraulic elevating table for the metal working industry. The table is made of rigid castings with machined table surface and is mounted on roller bearing casters with ball bearing swivels for easy moving about plant. It has a one-ton capacity.

The top rotates 360 degrees and clamps tight quickly in any position. The hydraulic foot control lever makes it possible to pump the table to desired height quickly and accurately without use of hands. This same advantage makes it possible to elevate material for feeding machines. A foot release valve lowers table. Heavy dies or fixtures are easily slid from the table to whatever machine table or working surface is desired. Optional floor clamping is also available. Other specifications are as follows: Maximum table height from floor (raised) 46½ inches; minimum table height from floor (lowered) 31 inches; table size 24 by 30 inches; base size 26 by 31 inches; weight 350 pounds.

For more data circle **118** on Reader Service Card



Midwest Portable Hydraulic Elevating Table

DESIGNED FOR THE MACHINIST'S TOOL BOX

Here's a catalog that exactly fits in a machinist's tool box in more ways than one. Not only are the Putnam Catalog physical dimensions exactly proportioned to fit within standard tool boxes so that it will always be handy, but, conveniently listed and illustrated within the Putnam Catalog are over 1400 different types and sizes of standard end mills.

Because at Putnam we specialize in the manufacture of end mills, you will find more standard sizes and types listed in this catalog than can be found in any other. Thus, on nearly every milling job you will find the quick and convenient answer to your end mill requirements right in your own tool box—in the Putnam Catalog.

If you would like a copy of this catalog, see your neighbor, the local Putnam distributor—this catalog is yours for the asking.

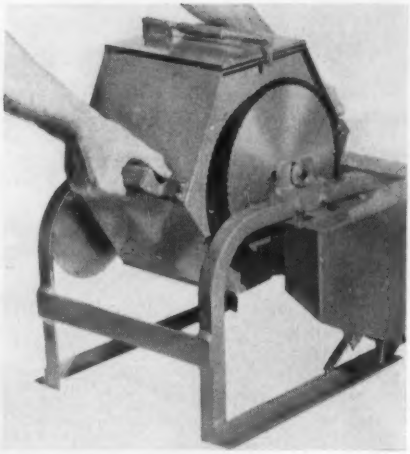
PUTNAM
TOOL COMPANY
2981 CHARLEVOIX AVENUE · DETROIT 7, MICHIGAN

For more data circle **454** on Reader Service Card

new shop equipment . . .

SLIDE-ABRADER FOR DEBURRING AND FINISHING

Chicago Wheel and Mfg. Co., 1101 W. Monroe St., Chicago, Ill., has announced its Handee slide-abrader for deburring and finishing small parts. According to the manufacturer, the new machine will pay for itself after fifteen runs. The device is engineered for deburring, radiing and finishing of small parts for machine shop, screw machine, die cast and stamping departments. The new machine is ruggedly constructed, has three-speed drive, an automatic timer and is portable. Novaculite, as well as all conventional types of tumbling media and compounds can be used with the machine, for the exact finish required.



Handee Slide-Abrader for deburring operations

For more data circle **119** on Reader Service Card

Adjustable Automatic Stock

Dahlstrom AUTOSTOP

No drill jig . . . no slotting . . . no milling. Specify whether for use on blanking, progressive or compound dies. Mounts on stripper plate in 15 minutes. $1.75 each; $18 doz.

Write for pamphlet.

BRANCH MANUFACTURING CO. **$1.75**

15 Olsen Drive • North Branch, Minnesota

For more data circle **455** on Reader Service Card

A Simple Formula for Solving Tooling Problems

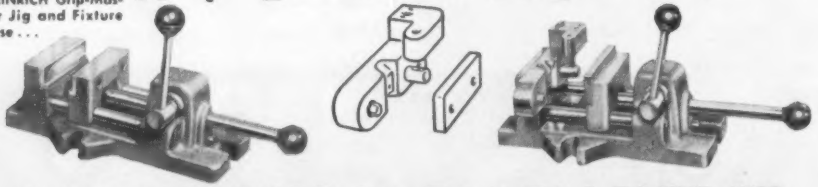
No need to start from scratch . . . use the HEINRICH Grip-Master Jig and Fixture base . . .

A + B

Simply add false jaws and bushing plate.

= C

Result . . . an accurate, low-cost Drill Jig.

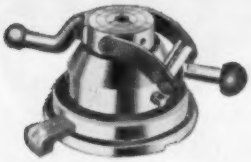


HEINRICH TOOLS, Inc. Dept. 116-L RACINE, WIS.

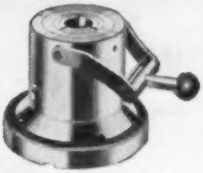
For more data circle **456** on Reader Service Card

Zagar Tools

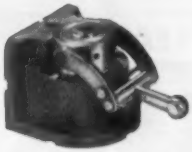
HOLD YOUR WORK—AND YOUR BUSINESS!



Collet indexing fixture



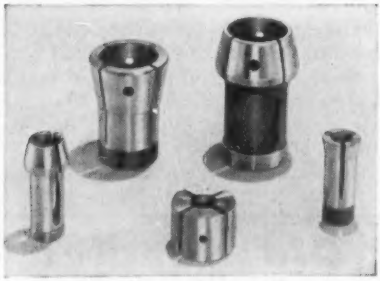
Collet holding fixture



Vertical-horizontal collet fixture

ZAGAR HOLDING and INDEXING FIXTURES

Zagar fixtures offer you a most inexpensive way to machine small parts. Set-up is speeded and much special tooling eliminated. Slot milling, straddle milling, drilling, tapping and grinding of small pieces can be done most profitably with Zagar fixtures, *available from stock.*



COLLETS, PADS, BLANKS

Five types: No. 310 Zagar Master; Nos. 2 and 6 W. & S.; No. 5-C; No. 6 W. & S. pads. All but Zagar No. 310 are standard machine tool sizes. All collets are made of oil-hardened tool steel; have flat tops for locating purposes.

Write for Engineering Sheets "S-11" on each product.

ZAGAR, INC.

23898 Lakeland Blvd., Cleveland 23, Ohio

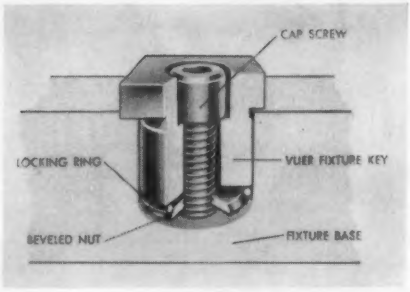
Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

For more data circle **457** on Reader Service Card

KEY LOCK FOR FIXTURE KEYS

Vlier Engineering, Inc., 8900 Santa Monica Blvd., Los Angeles 46, Calif., has developed a simple means of securing its fixture keys in the fixture base without drilling and tapping a screw hole. The new method, now an integral part of the key, consists of a cap screw, bevel nut and expanding lock ring. After inserting the fixture key into the reamed hole and selecting the proper flats, the cap screw is tightened. This action draws the beveled nut into the lock ring, expanding it against the wall of the reamed hole. The ring, made of music wire for greater strength and elasticity, locks the key in the reamed hole.

To remove the fixture key, the cap screw is simply turned counterclockwise. This forces the beveled washer out of the locking ring, permitting the ring to contract. The fixture key is then lifted out as an integral unit. The bevel nut is hardened against wear. The cap screw is staked on the inside end to maintain the assembly.



Vlier Fixture Key and Integral Key Lock

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"SEALFLEX" TUBING

Leakproof— Stays In place
For Coolants, Cutting Oils, Solvents

Made of steel with brass fittings — males, nozzles, stopcocks, etc., made in 1/8", 1/4", 3/8", 1/2", 3/4" I.D. *Write for bulletin and prices.*

VERMONT FLEXIBLE TUBING CO.
Lyndonville, Vermont

For more data circle **458** on Reader Service Card

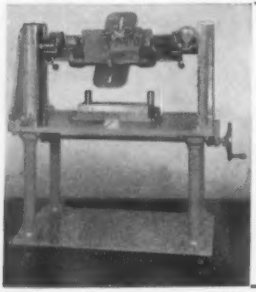
TRUE POINT DRILL SHARPENER
for Drills 41 - 60 and 61 - 80 R.H. & L.H.

A properly sharpened drill cuts faster — more accurately and is less likely to break.

Write for circular and full details.

UP-TO-DATE TOOL CO.
P. O. Box 99, Station A, Worcester 8, Mass.

For more data circle **459** on Reader Service Card



HAUSER *Die Handler*
For tool rooms, inspection, press and try-out departments.

Mobile or stationary. 180 degrees rotation of punch. Locks in any position. 24" x 40" base table. Ball bearing construction.
Dealer inquiries invited.

$987 F.O.B. FACTORY

WRITE FOR DETAILS

HAUSER MFG. CO. 234 MILL STREET ROCHESTER 14, N. Y.

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AMES

Check Motions or Dimensions In .001" up to 10" Range.

With Ames Long Range Dial Indicator models you can measure in .001", long slide travel, large cams, deep recesses or other dimensions requiring indicator spindle travel of up to 10". Also they have all the advantages built into Ames regular indicators:—large diameter dials, widely spaced dial graduations; movable dials; replaceable contacts, count hands to indicate revolutions of the indicator hand.

Send your problem in long range measuring, Ames will be glad to suggest a solution.

Representatives in principal cities

B.C. AMES CO.

29 Ames Street, Waltham 54, Mass.

MANUFACTURER OF MICROMETER DIAL GAUGES • MICROMETER DIAL INDICATORS

For more data circle **461** on Reader Service Card

HIGHER SPEEDS!
FASTER GRINDING!

kipp

AIR GRINDERS

MODEL JA
50,000 R.P.M.
$42.00
IN U.S.A.

Weight 12 ounces; length 6¼ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

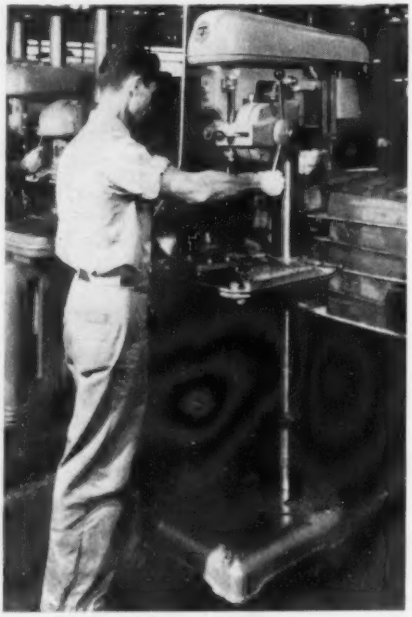
MADISON-KIPP CORP.
208 Waubesa St., Madison 10, Wis., U.S.A.
For more data circle 462 on Reader Service Card

new shop equipment . . .

20-INCH DRILL PRESS

Rockwell Mfg. Co., 460 Lexington Ave., Pittsburgh 8, Pa., has introduced its Delta 20-inch drill press. The machine, available in a wide range of models, combines the adaptability of a power tool with the ruggedness and capacity (holes of 1-inch diameter in cast iron, ¾-inch in steel in production operations) of a machine tool.

It is said that it will do the work of many machine tools costing four and five times as much and offers the additional advantage of portability. It can easily be set up for production operations in spots along the production line where it would not be practical to move a conventional machine tool into place. It can also be set up to operate with

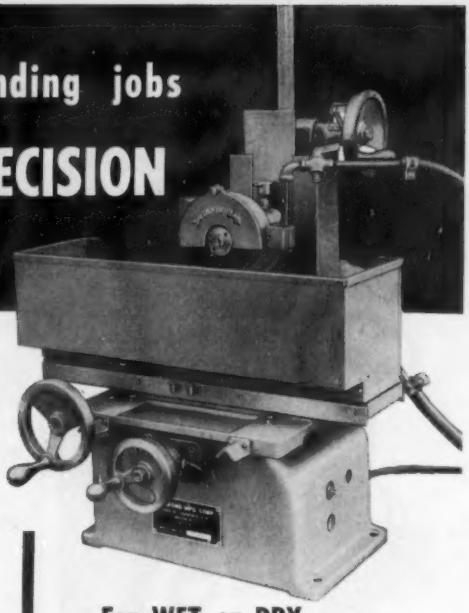


View showing Delta 20-inch Drill Press

to do small grinding jobs

to **MICRO-PRECISION**

FAST...



you need the

SANFORD
Model SG
SURFACE GRINDER

This unrivalled small parts grinder can be depended upon for micro accuracy. It's easy to use too . . . every hand wheel and operating switch is at your finger tips.

Designed and built by engineers and tool makers of rare foresight for tool, die and gage work, it has been constantly preferred after these many years of proven worth.

Write for fully illustrated literature, replacement parts and special attachments data with price list.

For WET or DRY grinding, specify optional equipment.

PARTIAL SPECIFICATIONS —

Chuck Surface—3"x5" or 4"x6".
Table travel — 8", traverse 4".
Vertical head movement — 6".
Work area under 4" wheel — 6", with chuck — 4".
Standard grinding wheel — 4" x 3/8" x 1/2".
Spindle speed—approx. 5500 RPM.
Motor, 1/6 HP, single or 3 ph., dynamically balanced.
Dimensions—23"x30"x27" high.
Net wt. approx. 160 lbs.

Representatives in major industrial areas

SANFORD MANUFACTURING CORP.
1022 Commerce Ave., Union, N. J.

For more data circle 433 on Reader Service Card

Send for our new brochure describing the 16 points of superiority of the VEET Precision Radial Drill.

MANUFACTURED BY
Veet INDUSTRIES
TELEPHONE PRescott 6-3000
25753 GROESBECK HIGHWAY EAST DETROIT, MICH.

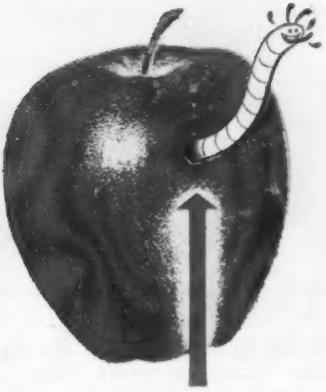
For more data circle **464** on Reader Service Card

other tools to combine production operations. Primarily a metalworking production tool, the press is also designed for use in tool shops, maintenance departments and model shops where it can do a variety of metalworking jobs.

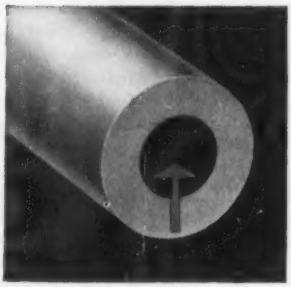
Spindle travel is 6 inches with heavy-duty, adjustable spring return. In addition to the depth gage on the depth stop, there is a quick-set depth gage on the pinion with a zero-start feature and a magnified scale for easier reading. Speeds range from 260 to 1,760 r.p.m. with a 1,140 r.p.m. motor, or 400 to 2,600 r.p.m. with a 1,725 r.p.m. motor. All models may be obtained with or without a power feed attachment. The power feed attachment may be added at any time to any model. Power feed offers four feed ratios. The elevating mechanism may be attached to either head or table of floor models. Maximum distance from spindle nose to table on the bench model is 26 inches; to base on the floor model, 44 inches.

A quick-release device, mounted on the forward end of the motor plate, to release belt tension and a streamlined belt guard make speed and belt changing easier with no possibility of damage to the belt. The belt guard is molded from fiber glass. It is stronger, pound for pound, than steel, won't crack like cast iron, dent like steel, rattle, corrode or rust. It swings back out of the way when speed changes are necessary. A worn belt can be replaced in a moment without dismantling any part of the machine.

The drill press head, cast in a single piece, and a centrifugally cast column with a wall ½-inch thick insure rigidity and accuracy during operation. A multiple-spline manganese steel spindle and full floating drive transmits power without belt pull, guaranteeing constant spindle alignment. Four bear-



a hole here makes waste...



a hole here saves waste

Crucible Hollow Tool Steels save waste—time and money—whenever you need ring-shaped parts or tools with a center hole. For the hole is in the piece when you get it! You eliminate drilling, boring, rough-facing operations — save machine capacity for productive work.

And you can get Crucible Hollow Tool Steels in *any* of our famous tool steel grades... in bar lengths or saw cut to your individual requirements. They are made in practically any combination of O.D. and I.D. sizes. What's more, delivery is *immediate* with Crucible's popular KETOS oil-hardening, SANDERSON water-hardening, AIRDI 15 high-carbon high-chromium, AIRKOOL air-hardening, and NU DIE V hot work tool steel grades from warehouse stocks.

Next time you have an application with a center hole, let your Crucible representative show you how these hollow tool steel bars can save you money and time. *Crucible Steel Company of America, Chamber of Commerce Bldg., 7th Ave. and Smithfield St., Pittsburgh 30, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

For more data circle **465** on Reader Service Card

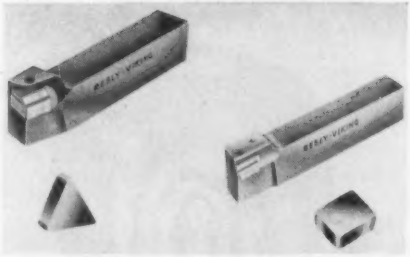
ings in the spindle construction are close to the work load, eliminating spindle play and maintaining accuracy through years of service.

For more data circle **121** on Reader Service Card

★ ★ ★

TOOLHOLDERS FOR THROW-AWAY CARBIDE INSERTS

Two new types of toolholders for throw-away carbide inserts have been produced for the use of metalworking industries by Besly-Welles Corp., 108 Dearborn Ave., S. Beloit, Ill. They are especially designed to provide low cost, mass produced cutting edges for all those whose production operations include metal removal work. Positive insert location, economical interchangeable replacement parts and a wide selection of negative and positive rake



View showing Besly-Welles Toolholder

holder styles, sizes and shanks make these tools extremely practical for everyday use. Triangular and square carbide throw-away inserts, in a variety of negative and positive rake dimensions, are also available for use with these holders. These toolholders and throw-away carbide inserts are said to eliminate the need for grinding carbides to fit the job.

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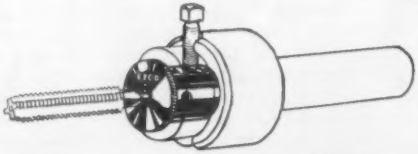

BYCO TAP BUSHINGS

Give Higher Quality Threads

. . . Less Tap Breakage

. . . Less Tap Wear

BYCO tap bushings have a square broached end to fit and drive all standard taps from No. 0 to 1⅜" and pipe taps from ⅛" to 1". Bushings are available in five o.d. sizes to fit ½, ⅝, 1, 1¼ and 1½ in. tap holders. Chrome hardened for long life. Self-centering screws on each side of bushing lock tap securely and assure absolute true positioning.

Write today for Bulletin MS

BYCO INDUSTRIES

2302 E. 31st St.

MINNEAPOLIS 6, MINN.

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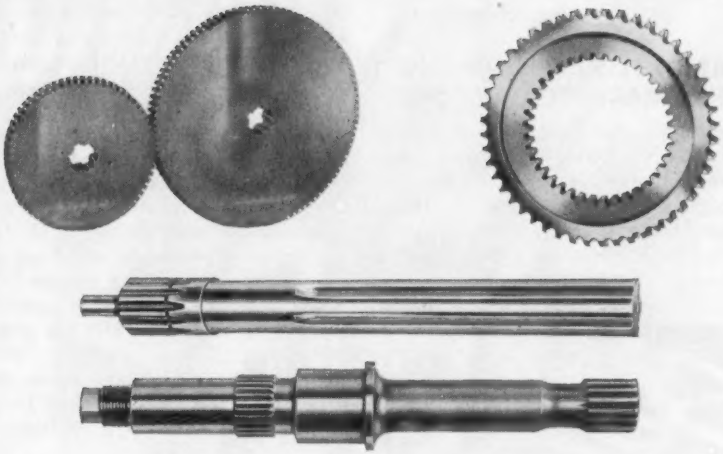

PRECISION GEARS

custom made for any requirement

By designing gears to meet the special requirements of your product, you can generally be assured of more efficient performance, and can frequently simplify operation.

We are specialists in producing gears made exactly to your specifications. While your product is still on the board, get in touch with us. We feel that we can offer the solution to your gear problems. The Adams Company, 1942 Cypress St., Dubuque, Iowa.

The Adams line . . . Spur Gears . Helical Gears . Bevel and Miter Gears . Worms and Worm Gears . Sprockets . Internal Gears (spur and helical) . Ratchets . Splined Shafts . Lead and Feed Screws . Shaved Tooth Gears (spur and helical) . Ground Thread Worms . Racks

The ADAMS Compa

Dubuque, Iowa, U. S. A.

ESTABLISHED 1883

GEARS

FINE GEARS MADE TO YOUR SPECIFICATIONS

For more data circle **467** on Reader Service Card

new shop equipment . . .

MINIATURE FLEXIBLE COUPLING FOR SUB-FRACTIONAL MOTORS

Lovejoy Flexible Coupling Co., Dept. MSC, 4801 W. Lake St., Chicago 44, Ill., has announced a miniature flexible coupling especially developed for sub-fractional horsepower motors and other small units. Typical sub-fractional motor applications include coding devices, radar equipment, film type and tape recorders, X-ray machines, actuators, laboratory test equipment and aircraft components. Others are solenoid units in dispensing machines, coin operated devices and similar units.

Rated at 1/20 h.p. at 1,750 r.p.m., the full range is from 0.003 h.p. at 100 r.p.m. to 0.103 at 3,600 r.p.m. Dimensions are $\frac{5}{8}$ inch o.d. by $\frac{3}{4}$ inch overall length. Bore sizes are $\frac{1}{8}$, 3/16, $\frac{1}{4}$ and $\frac{5}{8}$ inches. Bodies are standard in die cast aluminum, but can also be furnished in brass. Spiders are one-piece spider type and are made from a resilient Buna-N compound. This compound is equal to rubber in elasticity, strength, resilience and resistance to abrasion, yet is claimed to be superior in resistance to oils, chemicals, heat, ozone and aging. The coupling never requires lubrication and is otherwise maintenance-free.

For more data circle **123** on Reader Service Card

Lovejoy Miniature Flexible Coupling

Sesco positive holding

CAM CLAMPS

THEY MAINTAIN POSITIVE HOLDING PRESSURE—NEVER LOOSEN . . .

The effective clamping range solves the problem of variations in stock thickness up to ¼" and eliminates troublesome readjustments.

LAST INDEFINITELY . . .

→ because of heavy steel construction and precision assembly.

→ singly, or in multiple, on any machine tool, or operation.

→ and withstands severe vibrations, even on milling operations.

AND, THEY'RE AVAILABLE FROM STOCK IN 4 STANDARD SIZES . . .

→ with maximum holding pressure up to 1600 lbs.

→ and, 2 larger sizes are available on special order—with holding pressure up to 8000 lbs.

Patent No. 2,537,594

Sesco INC. 8881 Central Detroit 4, Michigan

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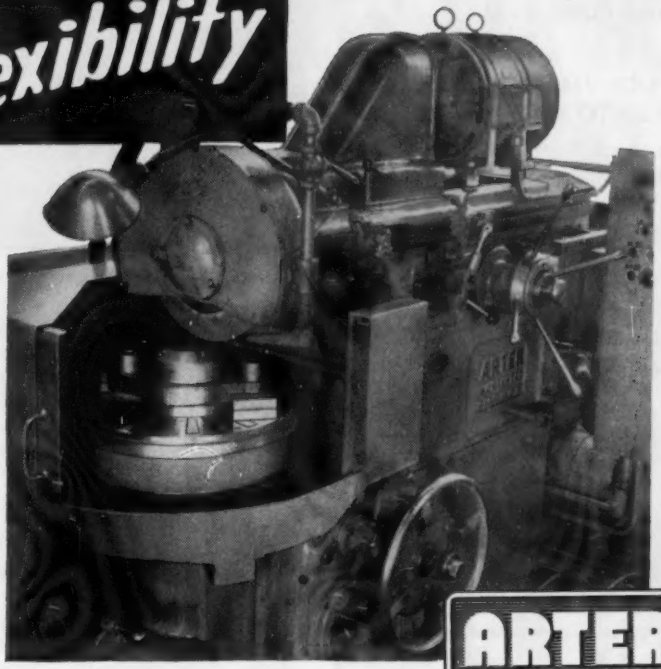
Flexibility



Arter Model D Rotary Surface Grinders are extremely flexible in their application to a wide range of surface grinding problems. By using special chucks, many seemingly difficult surface grinding jobs are made easy, permitting great savings in set-up time.

Here is one of General Electric's Arter Model D 16" Rotary Surface Grinders being used to grind punches for motor laminations. The chuck has a large diameter central hole to provide clearance for the shank.

The Arter Model D has great vertical capacity, hand and automatic feeds and a tiltable worktable. An arrangement for grinding work in a complete automatic push button cycle can be supplied.

For the best answer to your surface grinding problems — ask your Arter engineer.

ARTER GRINDING MACHINE COMPANY

WORCESTER 5, MASSACHUSETTS

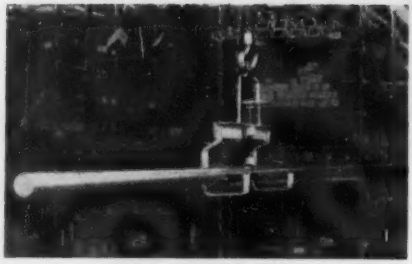
Jigmatic Automatic Tape Controlled Positioning Table • Rotary Surface Grinders
Flat Circular Cutter Grinders • Internal Grinders • Cylindrical Grinders • Carbide Tool Grinders

AGENTS IN INDUSTRIAL CENTERS OF UNITED STATES AND CANADA

For more data circle 469 on Reader Service Card

BAR STOCK HANDLER CAPABLE OF LOADS TO ONE-TON

A bar stock handler known as the "Bar-Lugger" is now available through the Express Roller Division, Industrial East Co., P.O. Box 561, Clifton, N. J. It is said to speed up and simplify the moving and handling of bar stock by 60 per cent, in and out of pigeonhole storage bins. Its chief features are to save worker's effort, reduce handling time for production and give more safety to workers. One operator can easily handle up to 6 inch round, square or hex-shaped bar stock where formerly two or even three men were required. As illustrated, the unit weighs 40 lbs., connects easily in one motion to the plant overhead conveyor.



Industrial East Bar-Lugger in operation

To store a bar of stock, the bar is securely picked up on the unit, clamped on the V-grooved rollers by means of a 1-inch 8 screw and quickly directed into the pigeon hole. By pushing slightly on the end of the bar, the rollers permit the bar to roll easily onto the rack. Withdrawal is the same, in reverse. Special advantages with use of the unit is that the operator can automatically hold and balance the stock in mid-air with no added support.

For more data circle **124** on Reader Service Card

CAMS

Fully equipped modern machine shop with extensive **Jig Boring, Surface Grinding, Horizontal Boring** and **Thread Grinding** facilities as well as modern **Cam Milling** and **Cam Grinding** equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC.
23-16 44th Road Long Island City 1, N. Y.

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SHARP
NAMEPLATE MARKING

Model No. 4

The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

NAMEPLATE DETAIL PRESS.
- Simple Operation
- Perfect Alignment
- Uniform Depth

GEO. T. SCHMIDT, INC.
1806 W. BELLE PLAINE AVE.
CHICAGO • 13 • ILLINOIS

For more data circle **471** on Reader Service Card

CUT TOOL COSTS
broken tools made like new again with **NU-TANGS**

Twisted or broken tangs replaced at low costs on any tool with a Morse Taper (sizes 1 to 6) Hundreds of leading industries save money on drills, reamers, countersinks, cutters, drivers, the NU-TANG way. Prompt delivery. Send for prices—or send tools for repair. All work guaranteed.

NO WELDING! NO SLEEVES!
NO SHORTENING! NO DISTORTION!

Send them to us like this! **GUARANTEED STRONG AS NEW!** *We return them like this!*

Patent No. 2,512,011 **NU-TANGS** INC. 1339 Bates Avenue Cincinnati 25, Ohio

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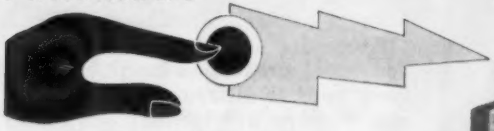
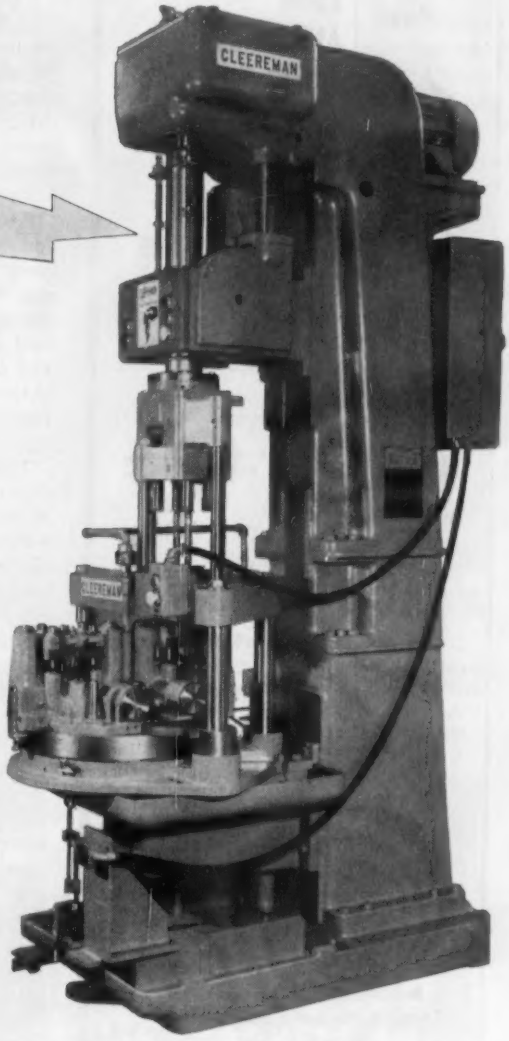
MORE PROFITS PER HOLE

with CLEEREMAN "Series A" *Automatic*





More Holes per Labor $ $ $

An automatic cycle that sets the production pace. Push button control leaves the operator free to handle piece parts easier and faster.

More Holes per Tooling $ $ $

The power to produce, coupled with extreme rigidity, drives cutting tools at utmost efficiency.

More Holes per Capital $ $ $

Fast set-up features, extreme versatility and operating speed broaden application and minimize idle time.

This machine,

equipped with two-station air operated indexing fixture and four spindle heads, has more than doubled previous production. Present installations are giving 125 to 600 cycles per hour with ease. The only limit is the machinability of your product.

WHAT is your problem?

Contact your nearby Cleereman distributor—or phone, wire or write direct.

BRYANT
Machinery & Engineering
• Company •
General Office
555 West Washington Blvd., Chicago 6
Representatives in Principal Cities

CLEEREMAN MACHINE TOOL CORP., Green Bay, Wis.

For more data circle **473** on Reader Service Card

Great Buys For

VICTOR'S 25TH ANNIVERSARY YEAR

Our Special Import . . .

DIAMOND WHEEL DRESSERS

Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

Karat	Regular Price	Our New Price
¼	$ 6.00	$ 2.85
½	12.00	5.00
¾	21.00	7.50
1	30.00	10.25
1½	54.00	15.00
2	75.00	20.00
2½	102.00	26.00
3	130.00	32.00

These diamonds can be set in any shank to your specifications for $1.00 each extra.

Order today—Immediate Delivery From Stock!

VICTOR

MACHINERY EXCHANGE, INC.

Dealers in Tool Room Equipment

Dept. B, 251 Centre St.

Tel.: CAnal 6-5575, New York 13, N. Y.

For more data circle 474 on Reader Service Card

new shop equipment . . .

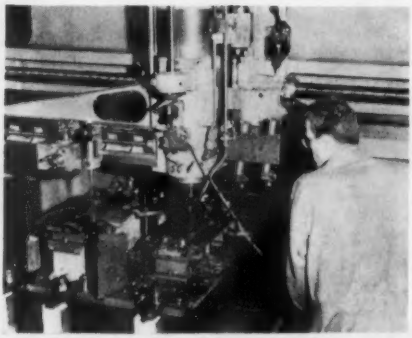
HIGH SPEED DUPLICATOR

Tracer Control Co., 595 E. Ten Mile Rd., Hazel Park, Mich., has completed development work in conjunction with Pegasus Laboratories on its new line of electronic-hydraulic tracer control machines. They are identified as the E-Series Duplimatics. Tracing at speeds required by the airframe industry is within the scope of this equipment.

Successful field demonstrations under actual production conditions have been made to airframe manufacturers and machine tool builders and orders are now processed for two and three feed tracers and remote control rise and fall tracers. An important feature of the unit is that it accomplishes plane and depth control with the aid of a single probe.

The unit allows tracing within full range of the machine tool. Conventional operation of the machine tool is not restricted. Unimpeded use of all conventional controls is accomplished after installation by automatic push button interchange. The tracer control equipment can be supplied as original equipment on machine tools or be installed on machines in the field.

For more data circle **125** on Reader Service Card



View of Tracer Series E Duplimatics in use

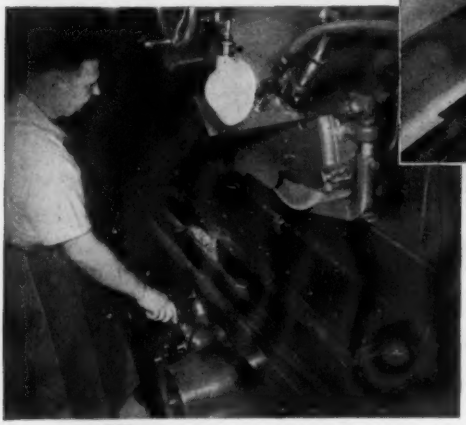
HOW TO CUT SET-UP TIME WITH Sundstrand Magnetic Chucks

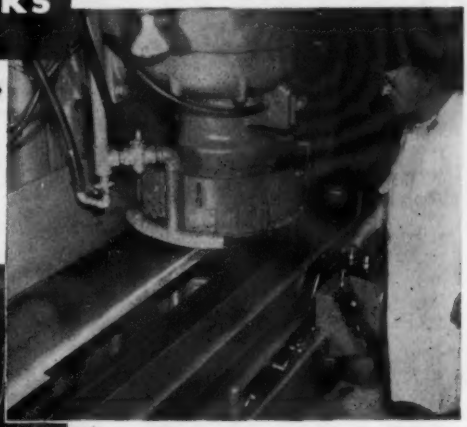
Here are two more examples of the profitable application of Sundstrand magnetic chucks to grinding operations. Similar, profitable applications have been made to milling jobs.

No matter how you are holding work pieces now, in grinding and milling, talk to a Sundstrand engineer. There is no obligation for this service.

SET-UP TIME CUT 30%

12"x96" transverse pole magnetic table on vertical spindle grinder holds various sizes of H.S.S. broaching tools at an average savings in set-up time of 30% over former method.





SET-UP TIME CUT 20%

Four 10"x40" POWER-GRIP Chucks on a 24"x96" horizontal spindle surface grinder hold ways, way caps, valve plates, broach holders etc. The four chucks can be operated individually or as one complete unit. Set-up time averages 20% less than previous method.

GET MORE FACTS

Write for further information on holding work for both grinding and milling operations.

SUNDSTRAND POWER-GRIP ®

SUNDSTRAND
Magnetic Products Co.
Division of Sundstrand Machine Tool Co.
1020-9th ST. • ROCKFORD, ILLINOIS

For more data circle 475 on Reader Service Card

new shop equipment . . .

THREE DIMENSION COMPARITOR FOR CAMS

A new concept of cam inspection that affords an absolute check of an infinite number of stations ten times faster than conventional methods known as the 3D Comparitor has been announced by the Parker Stamp Works, Inc., Hartford, Conn. By checking against a master, the device gives readings on both two and three dimensional cams that are accurate to tolerances of plus or minus 0.0002 inch although measurements of plus or minus 0.0001 inch are possible on highest precision work.

It also makes possible the complete, 100 per cent comparison of any two or three dimensional cam. While ordinary manual inspection checks only specified stations, the comparitor gives true readings on an infinite number of specified points, one, one hundred, one hundred million and also measures an infinite number of points between stations, compared with a master.

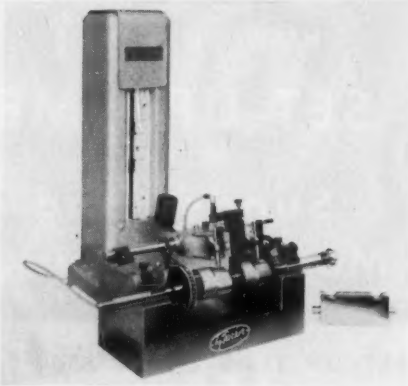
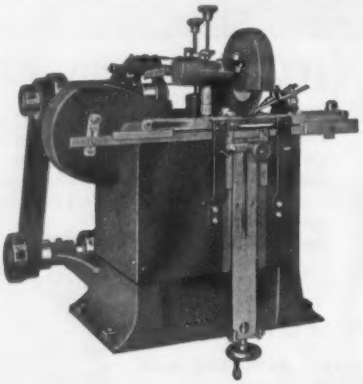


Illustration showing Parker 3D Comparitor



PAYS for ITSELF

Sharpen just one gross of hack saw blades (at least 6 times) and you actually will save the price of this machine.

WARDWELL MODEL EC COMBINATION GRINDER is the only single unit grinder adaptable for hack, band and circular saws that does not depend on the shape of the grinding wheel to form the shape of the tooth. This unique feature enables operator to grind a variety of blades without dressing or changing wheels.

Write for Bulletin EC Today

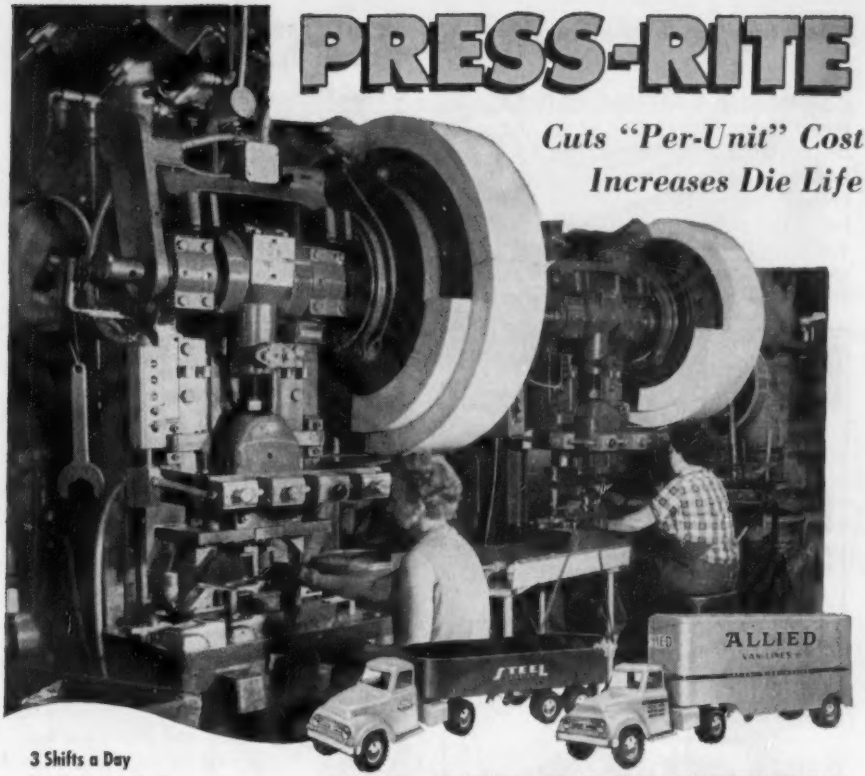
WARDWELL MANUFACTURING CO.
3803 Ridge Rd., Cleveland, O.

Maker of Largest Line of Saw and Tool Sharpening Machines

For more data circle **476** on Reader Service Card

PRESS-RITE

Cuts "Per-Unit" Cost
Increases Die Life



3 Shifts a Day
Seven Days a Week
that's the year 'round
schedule at
Tonka Toys

ALL-OUT PRODUCTION
at the TONKA TOYS Factory

True-to-life truck bodies are made of 20 gauge steel drawn to a depth of 2¾ inches.

Chassis, cabs, wheels, etc., are turned out by the thousands at Tonka Toys . . . and each one has to be *perfect* to pass the critical inspection of today's boys and girls.

Press-Rite Presses do the job better

Increased Die Life . . . the experience of Tonka Toys proves that Press-Rite's tie rod frame design gives rigidity that really pays off in reducing costly die wear. You get longer runs between die grinds and keep dies at peak efficiency. The Press-Rite Airflex Clutch protects dies against accidental breakage as air-pressure is adjusted for-the-job and allows the clutch to slip on "double headers"

Mound Metalcraft Company, the home of Tonka Toys, is now one of America's leading toy manufacturers. Their rapid growth is symbolized by their "repeat orders" year after year for additional Press-Rite Presses.

Press-Rite Presses ... Airflex Clutches . . . that's the combination that the folks at Tonka Toys have found gives them the highest production . . . at the lowest cost per unit.

PRESS-RITE has many exclusive features to make it today's TOP PRESS VALUE. Send for Catalog Today—get the money-saving facts on the Press-Rite Line. Speed Production and Cut Costs in your plant.

SALES SERVICE MACHINE TOOL CO.
2355 University Ave., St. Paul 14, Minn.

PRESS-RITE

OPEN BACK • INCLINABLE *Power Presses*
Used by more . . . for more production

For more data circle **477** on Reader Service Card

new shop equipment . . .

Current manual gaging techniques make inspection of five or six three-dimensional cams a good day's output, however it is said that the instrument checks 50 to 60 cams per day. An intricate three dimensional cam with 4,000 stations formerly demanded a full work week for inspection.

For more data circle **126** on Reader Service Card

BREMIL
The IMPROVED Compound Lever Shears
ALL ALLOY FULLY GUARANTEED
Two Sizes
PORTABLE
No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to ¼" steel plate.
BREMIL MFG. CO.
1020 Holland St., Erie, Pa.

For more data circle **478** on Reader Service Card

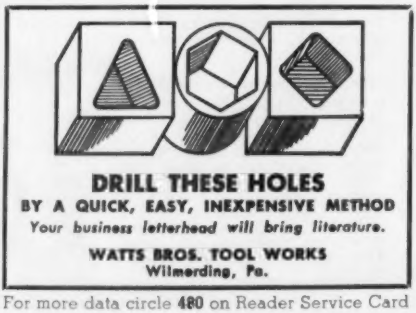
Hammond
of KALAMAZOO
2 IN 1
NO-DUST GRINDER
SAVE OVER 50% FLOOR SPACE THE HAMMOND WAY
OLD WAY
DUST-LADEN AIR IS A MENACE!
• Protect your employees' health.
• Protect nearby machine tools from dust and grit.
• Save floor space — requires only 6½ square feet.
For 10", 12", and 14" wheels.
Write for Catalog.
BUILT-IN DUSKOLECTOR
Hammond Machinery Builders, Inc.
1618 DOUGLAS AVENUE KALAMAZOO, MICHIGAN

For more data circle **479** on Reader Service Card

FIXED BASE 75-TON FRAME PRESS

The Minster Machine Co., Minster, Ohio, has announced its fabricated steel frame 75-ton fixed base G1 press. It is available in either flywheel or geared types with single speed or variable speed drive for either type. It has a long flanged slide with barrel type adjustment and box-type cast construction to eliminate way deflection and increase guiding to attain slide to bed parallelism so important to die life and product accuracy. It is available with standard manual slide adjustment, as shown, or with air power adjustment as an extra. Two pneumatic counterbalances on slide are standard.

Lubrication of the press shown in the accompanying illustration is a press driven cyclic type automatic oil system. However, a recirculating oil lubrication system is also available. Either flywheel or geared type presses are equipped with the patented combination air friction clutch and brake unit mounted on the crankshaft within the flywheel or main drive gear. On geared type presses, the gears are totally enclosed running in oil. Centralized Press Controls for both clutch and drive are supplied. Standard stroke of slide is 4 inches with a maximum 8 inch stroke available. Single speeds of 90 or 120 s.p.m. are standard for flywheel type presses and 40 s.p.m. for geared type. Bed area is 24 x 36 inches.


DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

For more data circle **480** on Reader Service Card

Now... Gorton Milling Machines Feature Hydraulic 3-Dimensional Controls

"Pencil Pressure" does the Work

Gorton now offers you several models of Super-Speed Vertical Mills equipped with sensitive and accurate hydraulic controls featuring feeds up to 40 inches per minute.

AVAILABLE 3 WAYS

1. Vertical action only
2. Cross and longitudinal
3. Three-dimensional combination

Gorton Milling Machines with hydraulic Tracer Control must be ordered as such. Hydraulic equipment is not an attachment but a permanent installation.

For die or mold work (single or multiple units), production profiling and duplicating — short runs, experimental pieces or high production.

Gorton also offers manual and automatic Tracer-Controlled Milling Machines and Pantographs for 2- or 3-dimensional operation; 1 to 1 ratio, or reproduction at variable reductions, with single or multiple-spindle machines for work of any shape or size.

Shown above: Gorton 9-J Super. Speed Vertical Mill with True-Trace hydraulic installation.

Write for Form 2697-ADS and 1711-1655 General Catalog.

GORTON

GEORGE GORTON MACHINE CO.

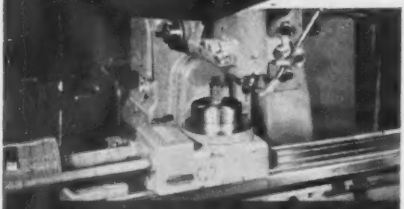
1711 RACINE STREET • RACINE, WIS., U. S. A.

SINCE 1893

Tracer-Controlled Pantographs, Duplicators — standard and special . . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

For more data circle **481** on Reader Service Card A 8731-1PA

How To Increase Production And Improve Accuracy



With a SUNDSTRAND Automatic Index Base

In many cases, the addition of this Automatic Index Base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this service.

Accurate Spacing, Powerful Clamping Insures Accuracy

Sundstrand Automatic Index Base

This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

Get Complete Data Free

This 8 page booklet contains production figures and specifications. Send for your copy today. Ask for bulletin 574.

SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

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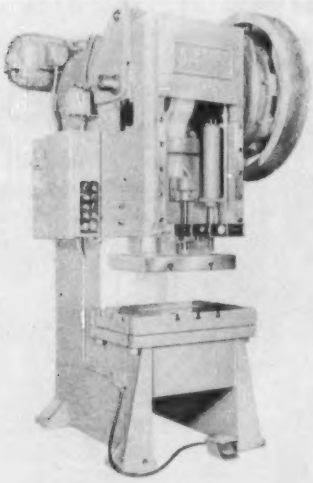
new shop equipment . . .



View of Minster 75-ton Fixed Base G1 Press

Slide area is 18 inches x 24 inches.

Fixed base G1 presses may be equipped with bed attached or sliding type die cushion. The press has all controls, both electrical and air, completely mounted on the press. It's ready to go with but a single connection each for air and electricity—a feature that adds greatly to ease of installation. It is also available as an inclinable type.

For more data circle **127** on Reader Service Card

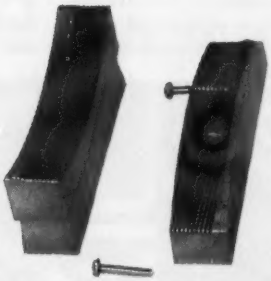
★ ★ ★

PRECISION JIG GRINDER UNIT

A precision jig grinder unit for use with horizontal spindle surface grinders has been announced by Production Machinery Development Co., 4847 St. Aubin Ave., Detroit 7, Mich. This unit, the Jocar "JG" Jig Grinder, is said to provide all of the elements for size control, hole generation, arc angular size

Prutton THREAD ROLLING MACHINERY

WOOD AND SHEET METAL SCREWS



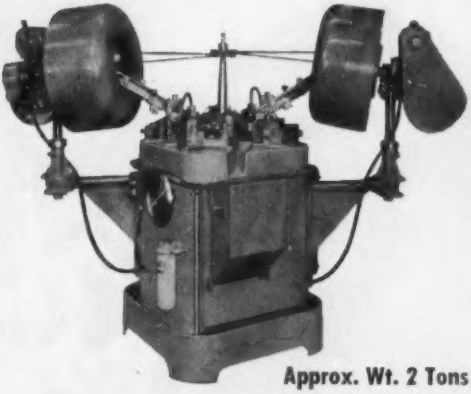
In addition to Type A and Type B Sheet Metal Screws (at a maximum capacity of No. 12 diameter by 2" thread length), Prutton Thread Rolling Machines also produce Wood Screws and Twinfast Wood Screws at record breaking production rates.

Boost your production! Increase your profits! Submit your parts for our recommendations. No obligation, whatsoever.

UP TO 25,000 PCS. PER HOUR!...

Prutton Exclusive Planetary Dies and Thread Rolling Machines are setting new records in regular production of wood and sheet metal screws. The special designed dies are in sections inserted in a planetary holder; easily and economically replaced in case of excessive wear of any part.

The male and female dies shown, roll precision close-tolerance threads to an end point from blanks with square end.



Approx. Wt. 2 Tons

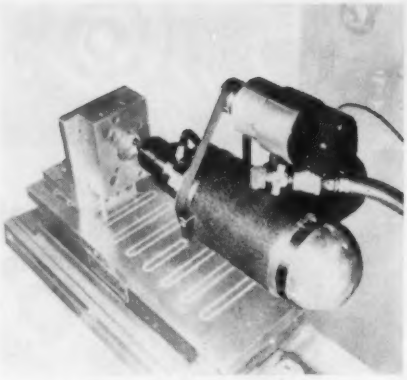
Prutton Corporation

5298 WEST 130th ST. CLEVELAND 30, OHIO

For more data circle **483** on Reader Service Card

and placement control, and power operation of the spindle carrier, relying on the surface grinder for axis positioning only. Operating in a horizontal position, the Jocar "JG" Jig Grinder uses the head and saddle of the surface grinder for arc coordinates and manual table movement for oscillating action necessary in jig grinding.

The unit was designed to adapt to most conventional horizontal spindle surface grinders, providing precision size control and hole generation normally associated only on jig grinding machines. This unit is guaranteed to have no more than 0.0002 inch total indicator reading runout. The Jocar "JG" is said to provide 5 inch i.d. grinding capacity with 1 inch diameter wheel with size control while grinding up to 1 inch increase or decrease in



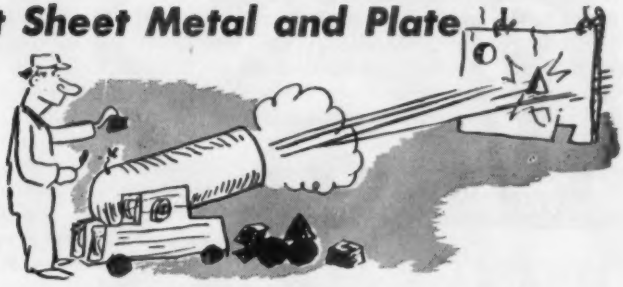
Jocar "JG" Precision Jig Grinder Unit

ENGINEERED
Live Centers
SHANK
GREASE SEAL
LARGE THRUST BEARING
LARGE RADIAL BEARING
CUSHION ACTION
GROUND TRUE RUN BEARINGS
Standard shanks with Morse tapers carried in stock ... send us your specifications and blueprints ... we will see that your job is set up with the right LIVE CENTER
STURDIMATIC TOOL COMPANY
3904 F STREET • DETROIT 16, MICH.

For more data circle **484** on Reader Service Card

There are many FANTASTIC *ways*

to Produce Holes in Flat Sheet Metal and Plate

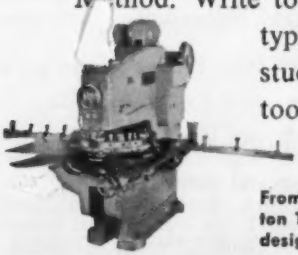


...but cost conscious production men use WIEDEMANN

TURRET PUNCH PRESSES

You will save money with a Wiedemann on your short run piercing operations. In fact, a Wiedemann will cut your piercing costs 60% to 90%—because a Wiedemann means . . . no set up . . . no layout . . . reduced handling . . . low cost, on-the-spot engineering changes.

It will pay you to get the facts about the Wiedemann Method. Write today for Bulletin 101, or, better yet, send typical drawings of your work for a free time study and a recommendation of the press and tooling best suited for your needs.



From the small, hand operated R-2 to the 150-ton Turret Punch Press, there's a Wiedemann designed for your short run piercing needs.

WIEDEMANN MACHINE COMPANY

4219 Wissahickon Ave., P.O. Box 6794, Philadelphia 32, Pa.

For more data circle **485** on Reader Service Card

size. Manual positioning of the grinding spindle offers a complete range from the smallest diamond impregnated arbor to the maximum wheel capacity of the grinding spindle. Widely spaced direct reading graduation in 0.0002 inch increments allows the operator to interpolate for finer size control while grinding. A specially designed anti-backlash arrangement allows internal or external grinding with assurance of movement during the smallest increment change.

The grinder comes in two basic models: all electric for shops without compressed air supply, and air-electric where sufficient air volume is available for ½ or ¼ h.p. operation.

The jig grinder is built to fit almost all makes and models of horizontal spindle surface grinders with adjustment for parallelism with table movement in all planes. Adjustment for squareness with a table mounted right angle plate for holding the work is also possible. As a complete manually operated jig grinding machine, the unit is offered with 10 x 15 inch slide movement, together with the Jocar unit.

For more data circle **128** on Reader Service Card

★ ★ ★

MILLING AND CENTER DRILLING MACHINE

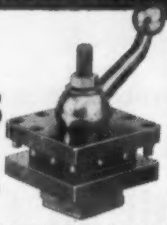
The Motch & Merryweather Machinery Co., Cleveland 13, Ohio, has designed and built a universal milling and centering machine to handle a complete range of sizes of truck steering nuckles. The part has a shank end that must be milled to length and centered with the opposite end centered on the flange between the protruding bosses.

Manually loaded in a fixture on a

MANHATTAN'S MIRACLES!
TOP VALUE — LOWEST PRICE

TURRET TOOLPOSTS

SAVE 33⅓%



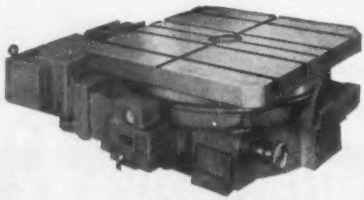
12 position indexing • Machineable base Block can mount 4 different tools • 3 working positions • Precision made in West. Germany

Model	Tool Block	Tool Range	Price
2½"	2½" x 1⅜"	¼" x ⅜"	$16.00
3½"	3½" x 1¾"	⅜" x ½"	$24.00

For tremendous savings, write for circular listing sensational bargains.

MANHATTAN SUPPLY COMPANY
The Cutting Tool Discount House
151-A GRAND ST., NEW YORK 13, N.Y.
Telephone: CAnal 6-4992

For more data circle **486** on Reader Service Card

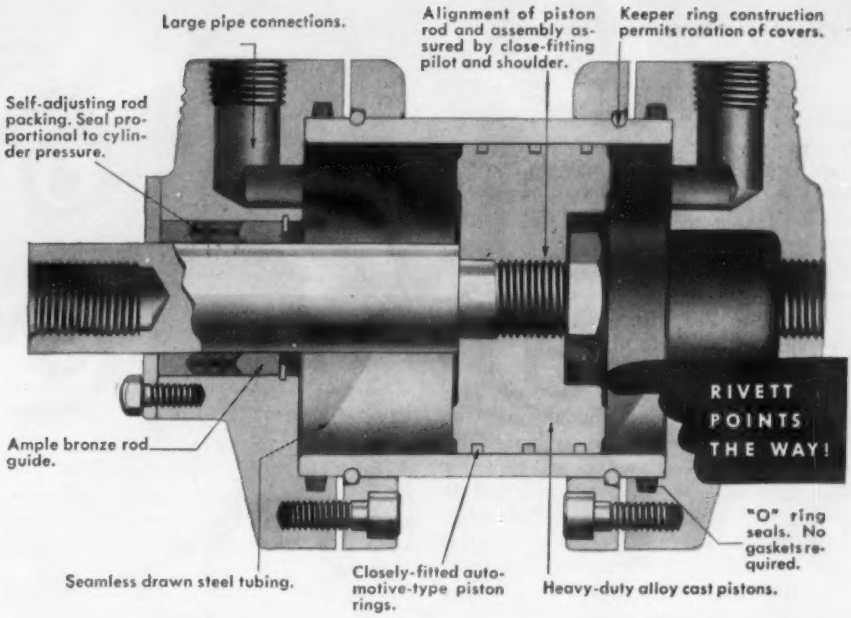


FASTER set-ups and positioning

You save set-up and positioning time with Gilbert rotary tables. *Hand-indexing:* 36" and 50" square or round. *Power rotary* and *power feed:* 36", 50", 60", and 72" square or round. Special tables built to your requirements. For complete descriptions and specifications, *write for Bulletin 854.*

THE CINCINNATI **GILBERT** MACHINE TOOL COMPANY • CINCINNATI 23, OHIO

For more data circle **487** on Reader Service Card


Large pipe connections.
Alignment of piston rod and assembly assured by close-fitting pilot and shoulder.
Keeper ring construction permits rotation of covers.
Self-adjusting rod packing. Seal proportional to cylinder pressure.
RIVETT POINTS THE WAY!
Ample bronze rod guide.
"O" ring seals. No gaskets required.
Seamless drawn steel tubing.
Closely-fitted automotive-type piston rings.
Heavy-duty alloy cast pistons.

Sealing efficiency improves with increased pressure in Rivett 1500 PSI* Cylinders!

*Higher on application.

- External "O" Rings Act As Static Seals To Eliminate Gaskets And Assure LEAKPROOF OPERATION!
- Automotive Type Piston Rings Reduce Friction, Increase Sealing Ability, Permit Sensitive Response To Any Pressure.
- Self-Adjusting Rod Packing Cuts Friction.
- Unfailing Power For Millions Of Cycles.

1080 SELECTIONS!

7 mountings; 10 bores; standard and 2:1 rod; single and double end rods; internal or external thread; cushioning.

RIVETT, INCORPORATED, Dept. MMV 11
Brighton 35, Boston, Mass.

Get Catalog No. 106. Drawings, specifications, cut-aways, tables!

THE BETTER YOU KNOW HYDRAULICS THE BETTER YOU LIKE

RIVETT
"100"
HYDRAULIC CYLINDERS

For more data circle 488 on Reader Service Card

movable table, the part is automatically equalized radially in self-centering jaws at the stem end. A hydraulically actuated locating arm swings down between the bosses to move and locate the forging for length. The flange end is then secured by a top clamp and the end locator retracts. The fixture table traverses to the milling head fixed on the base at the left of the table. The stem end is then milled and the table returns to the starting position. The center drill unit, fixed on the base at the left side, center drills by hydraulic quill feed. The same type of unit, on the right side, is mounted on a saddle to traverse to feed position between the protruding bosses. The cycle is automatic, including unclamping when completed. The milling head is a single speed, heavy-duty production unit. The drill units are a single speed, hydraulic quill feed type. Production of this machine averages 90 to 120 pieces per hour at 100 per cent efficiency.

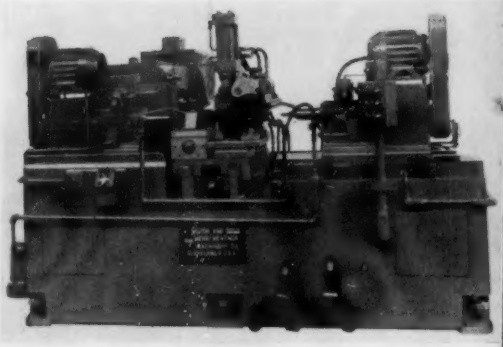


Illustration showing Motch & Merryweather Universal Milling and Centering Machine

For more data circle **129** on Reader Service Card

STERLING
Model "DV"
Variable Angle
DRILL GRINDER

ONE Drill Grinder Sharpens *ALL* Drills

- **90° to 140° Included Angle**
- **⅛" to 2½" Diameter**
- **2-3-4 Flutes**
- **Without Chucks or Collets**

Write for complete information on the STERLING Model "DV" Drill Grinder

McDONOUGH MFG. CO.
1521 GALLOWAY • EAU CLAIRE, WISCONSIN

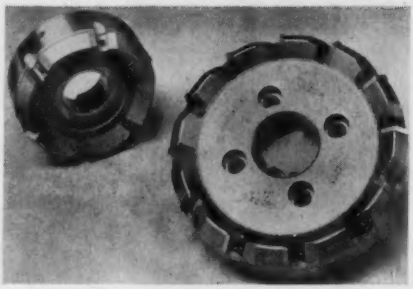
For more data circle **489** on Reader Service Card

BAY
STATE
PRECISION
PERFORMANCE...
To the navigator, precision performance means the skillful manipulation of his sextant to ascertain the exact latitude and longitude of his ship.
To tap users, precision performance means production-line continuity, better threaded parts, increased tap life . . . and BAY STATE!
BAY STATE TAPS
Bay State Tap & Die Company
Mansfield, Massachusetts
On the shelves of your local Industrial Supply Distributor

MILLING CUTTERS FACILITATE USE OF THROW-AWAY INSERTS

A new series of "No-grind" milling cutters, designed for use of indexable throw-away Wessonmetal carbide inserts with commercial-ground thickness tolerances, has been introduced by Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich. While retaining all of the features of the previous series, the new cutters serve to further advance the utilization of throw-away inserts for milling.

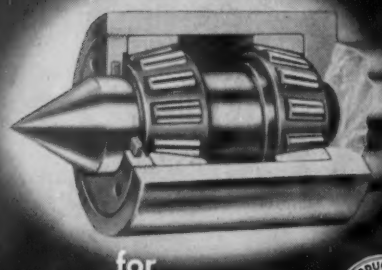
Among the new features provided by the series are: ability to use standard throw-away inserts with commercial-ground thickness tolerances, rather than special inserts ground to gage-like tolerances; a single locking mechanism with only two parts—a wedge which also forms a smooth-flow chip gullet, and a screw which locks and unlocks the blade with only a half turn; elimination of any projections, including screw heads that could interfere with chip flow; accurate insert location is obtained simply by dropping it into the insert slot; concave form of the top of the wedge directs and controls chip flow for free cutting and improved milling efficiency; use of specially harden-



View of Wesson "No-grind" Milling Cutters

...accurate beyond comparison

Falls ROTO CENTER



Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.

for lathe and grinder tail stocks

FREE BULLETIN 105 "What you should know about LIVE CENTERS"

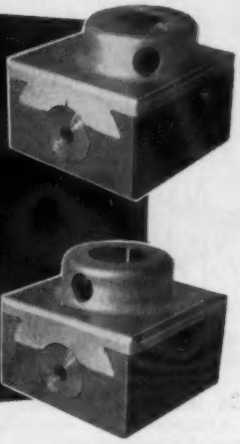
FALLS PRODUCTS, INC., 124 Genoa Street, GENOA, ILL., U.S.A.

For more data circle 491 on Reader Service Card

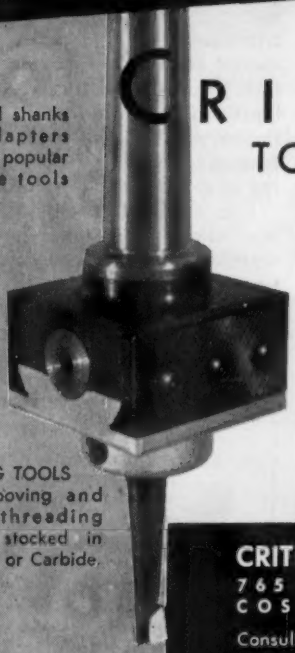
Which boring head will do your job?

CRITERION makes a wide range — 1½ to 7 inches in diameter. Bore accurate holes ⅛ to 20 inches.

CRITERION Heads feature widely spaced graduations — Easy reading — Accurate adjustment — Rugged construction — Dependable operation. Built for long life and chatter-free performance.



Ground shanks and adapters for all popular machine tools



BORING TOOLS
Boring, grooving and internal threading tools are stocked in High Speed or Carbide.

CRITERION
TOOL PRODUCTS

Select your boring head for ROUND or SQUARE shank tools.

DIVERSIFIED OPERATION
Check the application of these tools on Turrets or Automatic Lathes.

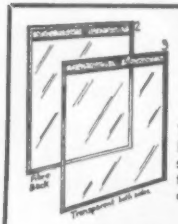
MAXIMUM OFFSET TRAVEL
Save time—Money—Eliminate excessive tool change.

CRITERION MACHINE WORKS
765 WEST SIXTEENTH STREET
COSTA MESA, CALIFORNIA
Consult your dealer or write for free catalog.

For more data circle **492** on Reader Service Card

ed steel concave wedges minimizes wear; and design of the cutter body and wedge provides a large amount of blade support. Virtually the entire back face of the blade is supported by steel while the wedge bears on half of the entire front face.

For more data circle **130** on Reader Service Card



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protect

Shop Orders, Drawings, Blueprints, Etc.

Two styles. No. 2 with fibre back, No. 3 transparent both sides. Non-inflammable acetate windows. Special style or size to order.

Write for details.

WADE INSTRUMENT COMPANY

Dept. M, R.F.D. No. 1, Chardon, Ohio

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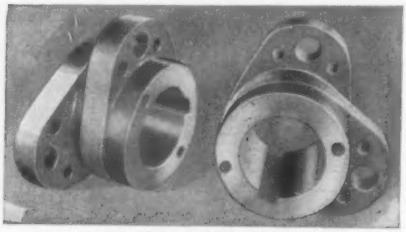


Diesel Engine Cams produced by Rowbottom

Rowbottom for Cams

Need hardened and ground cams?

If you're looking for longer cam life, lower maintenance costs and higher load capacity, let Rowbottom furnish you cams ground after hardening . . . a service available to all cam users. Send specifications or drawings for estimate.

THE ROWBOTTOM MACHINE CO.
WATERBURY, CONNECTICUT

Also Cam Milling and Grinding Machines for producing cams of all types. Ask for details.

For more data circle **494** on Reader Service Card

AUTOMATIC PLATEN-TYPE BELT GRINDER

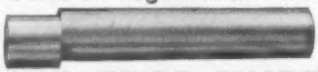
For high-speed precision grinding and finishing of outside diameters, a new automatic rotary abrasive belt grinder has been introduced by Engelberg Huller Co., 103 Seneca St., Syracuse, N. Y. It can be used for o.d. grinding of ferrous and non-ferrous metals, plastics, ceramics, glass and other materials and is designed to handle circular parts from 26 inches to 40 inches in diameter. It can be modified to meet other diameter ranges.

The self-contained motor-driven work table rotates at standard speeds of either ¾ or 3 r.p.m., with optional change gears for other r.p.m. requirements. An air-controlled infeed mechanism carries the rotating parts in against the belt and infeed travel is adjustable with a minimum of 0.0016-inch per revolution. To insure even distribution of belt wear, the parts are moved back and forth across the belt face by means of an air-hydraulic reciprocating device, with 7-inch oscilliation stroke. The table is adjustable from 0 to 45 degrees for angular grinding operations.

For applications requiring deburring, such as stator rings or bucket wheels, a tampico brush attachment is provided as an optional attachment. The brush is moved in against the belt-ground work by a manual control wheel and can be swiveled to coincide

1 Minute

to locate an edge within .0005"!



JUMP EDGE FINDER

PRICE $2.50 Complete satisfaction — or full refund.

Postage free if payment with order.

ELISHA PENNIMAN ELMWOOD 10, CONN.

For more data circle **495** on Reader Service Card

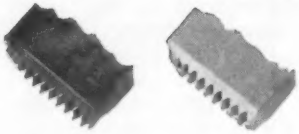
V-B Liquid Honing*

Your Way to Say:

"MOST MODERN PRODUCTION BLASTING EVER DEVELOPED!"

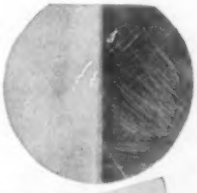
This Machine Should Be Processing Your Parts

Metals, plastics, ceramics — any materials you use — can be Liquid Honed fast and to close tolerance. Send a sample scale-covered part with a letter describing your problem. Liquid Honing engineers will remove the scale and return the part with their recommendations. No cost to you...no obligation.

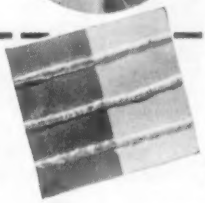


Vapor Blast Liquid Honing removes heat treat scale faster than conventional tumbling or any other process, and without pitting the steel.

DOLLAR FOR DOLLAR, JOB FOR JOB, NO OTHER SURFACE-CONDITIONING METHOD CAN EQUAL LIQUID HONING.



Vapor Blast Liquid Honing blends out grind lines, as shown in the area to the left. The smooth, non-directional surface is ideal for oil flow and unequalled lubrication. Liquid-abrasive action also hones down tiny burrs along edges of parts like this one.



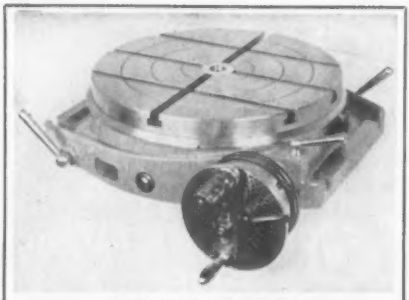
This unretouched photo of three weld seams shows how efficiently you can remove mill scale, rust, welding and heat discoloration. Top weld is stainless steel; next, copper brazing; bottom, common steel.

VAPOR V-B BLAST
MILWAUKEE, WISCONSIN

VAPOR BLAST MFG. CO.
3013 WEST ATKINSON AVENUE
MILWAUKEE 16, WISCONSIN

"Vapor Blast" and "Liquid Honing" are trademarks

For more data circle **496** on Reader Service Card



WALTER

PRECISION DIVIDING ROTARY TABLES

With & Without Dividing Discs

- READABILITY: 6 SECONDS.
- CONSTRUCTED FOR LONG LIFE.
- MAINTAIN PRECISION.
- AVAILABLE IN 10", 12½", 15¾", 19¾", 25", 31".

Also many types of **Universal Precision Dividing Heads and Attachments** for most economical production.

Test reports furnished with literature.

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NEISE MODERN TOOLS

KARL A. NEISE
404 4th Ave., Dept. MMS, New York 16, N. Y.

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LET *HIGH-SPEED* KNOW-HOW

• Increase Production
• Reduce Costs • Improve Quality

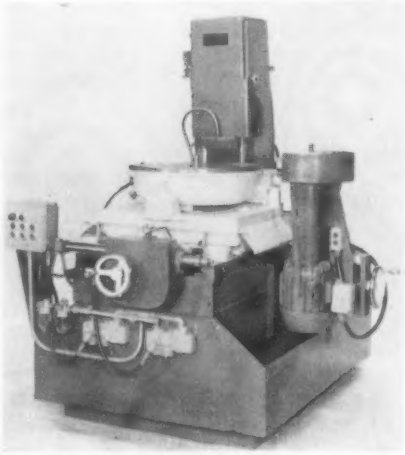
—*NEW*, NOISELESS RIVET SPINNER

The new noiseless, motor-driven Rivet Spinner is the latest addition to the High Speed Hammer line of cold riveting machines and stakers. Has rivet capacity to 5/16" diameter, spindle travel ¾" adjustable downward. Two models . . . floor or bench, designed for either foot or air operation. Produces absolutely uniform assemblies at every cycle, increases operator's efficiency. Air operated model eliminates fatigue. High Speed Hammer provides ***FREE ASSEMBLY ENGINEERING SERVICE.*** Send parts and/or prints. We'll recommend the right operation covering tools, procedure, cost estimate and equipment to use. No cost or obligation.

HIGH SPEED HAMMER CO., INC.
315 Norton St., Rochester 21, N. Y.

We have the most complete line of riveting machinery and can recommend the correct type machine, tooled and ready, to go into operation upon receipt.

For more data circle **498** on Reader Service Card



Engelberg Huller Abrasive Belt Grinder

with grinding angle of machine table.

Standard abrasive belt size is 8 x 107 inches, with belt speed available from 2,000 to 5,000 s.f.p.m., depending on application. Capacity of coolant unit, equipped with ½ h.p. coolant pump, is 100 gallons. The grinder is 70 inches long, 70 inches wide and 76 inches high, and is powered by a 10 h.p. motor. Work table height is 47 inches. Approximate shipping weight of the machine is 4,700 pounds.

For more data circle **131** on Reader Service Card

★ ★ ★

INDUCTION HEATING EQUIPMENT

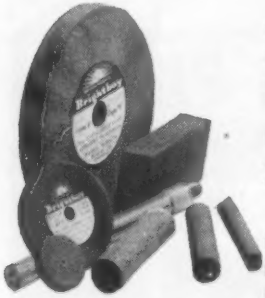
Lepel High Frequency Laboratories, Inc., 55th St. and 37th Ave., Woodside, N. Y., has developed a production fixture to braze metal assemblies without the use of flux, by induction heating under a controlled atmosphere. The joints produced with this unit are uni-

There Are Many
NEW APPLICATIONS
Never Before Associated With Finishing
FOR TODAY'S
RUBBER-CUSHIONED
ABRASIVES!

Replacing
Costlier,
Slower
Methods

TIME SAVINGS FREQUENTLY 50%

BURRING, CLEANING, FINISHING, POLISHING—*IN ONE OPERATION*



Investigate Brightboy's unique rubber-and-abrasive action, which you must see to believe! It has pioneered a completely new concept of finishing, widely broadening the scope of abrasive applications.

Readily available, multi-use Brightboy STOCK grains and textures are job-matched to your work. In many instances they completely eliminate the expense and delay of ordering "specials".

Choose from the wide range of Brightboy abrasive grains in Silicon Carbide and Aluminum Oxide. Grains and textures range from extra fine to extra coarse—ALL in soft, firm and tough rubber binders.

Ask your dealer for Brightboy recommendations and for the Brightboy Catalog listing grains, textures, machine speeds and work suggestions. Write us if he cannot supply you, or on any problem in which finishing is involved.

WELDON ROBERTS
Brightboy
RUBBER CUSHIONED ABRASIVES

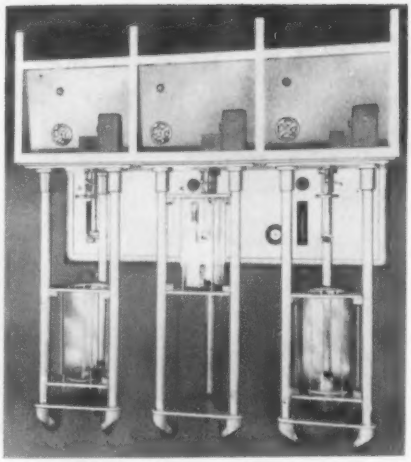
BRIGHTBOY INDUSTRIAL DIVISION • WELDON ROBERTS RUBBER CO. • 95 N. 13TH ST., NEWARK 7, N. J.

America's Pioneer Manufacturer of Rubber-Bonded Abrasives

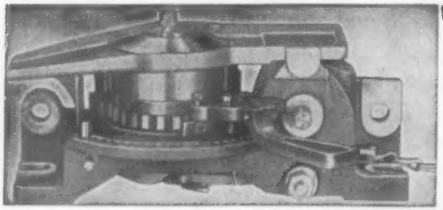
For more data circle 499 on Reader Service Card

formly sound and free of residual or entrapped flux. They are required in numerous assemblies to insure dependable corrosion-resistance and strength in critically stressed inaccessible parts. Such joints are impossible to achieve with normal brazing techniques. In addition, this process leaves a smooth fillet and eliminates the cost of cleaning as well as the cost for fluxing.

Combining induction heating, which provides rapid localized heating, and a controlled atmosphere, this unit has successfully joined copper alloys, steel and stainless steel assemblies on a production basis. The three work stations are operated from a single induction heating unit. High frequency current is fed to the work coils through coaxial leads. The proper atmosphere is obtained by directing a continuous flow of purified gas into the glass or plexiglass bell. The flow of gas is controlled by the flow meters at each of the three



View showing Lepel Induction Heating Fixture

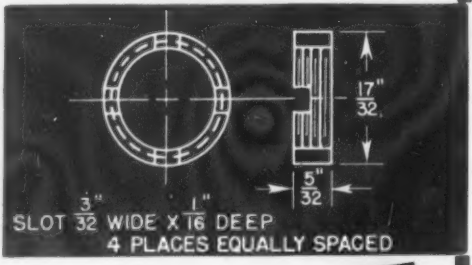


1200 PIECES
PER HOUR

This piece was made from brass rod and slotted as shown in the print below. Production on this item was 1,200 pieces per hour.

DEARBORN
Automatic Chucking and Indexing Fixture

FEATURES:
1. Work held by collets
2. Automatic opening and closing
3. Work automatically ejected
4. Automatic indexing if required
5. Three models with capacities from 1/32" to 2".



J. W. DEARBORN
ANSONIA • CONN.

Write for illustrated data. Send blueprints or specifications of work.

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BLOHM HORIZONTAL SURFACE GRINDERS

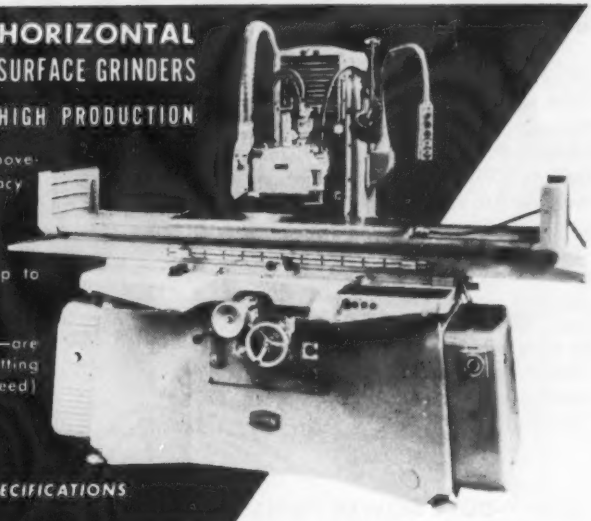
FOR HIGH PRECISION, HIGH PRODUCTION

TABLE—performs cross movement for maximum accuracy

SPINDLE—has 5 hp motor drive and adjustable tapered bearings. Takes wheels up to 4" wide with cross feed up to 2½" per stroke

IN-FEED and DEPTH-FEED—are exclusive Microtip, permitting adjustment to .0002" (in-feed) .00004" (depth)

5 MODELS—12" x 18" to 12" x 48" capacity



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THE DRILLS WITH THE ULTIMATE IN SIMPLICITY AND ACCURACY OF CONTROL

COLUMN—8" to 22" diameters

SPINDLE—3 to 8 feeds, 8" to 18" travel, 46" to 73" clearance nose to base

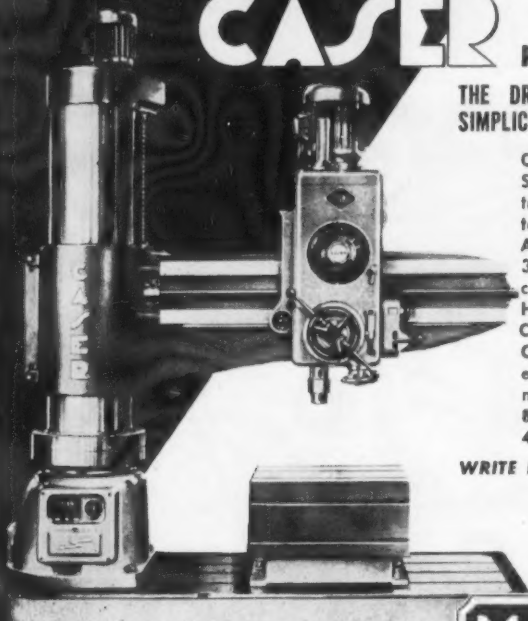
ARM—2'6" to 8' lengths, 23-3/16" to 34" vertical travel on column.

HEAD—23" to 80" travel on arm

CAPACITY—1" to 3-3/16" in steel

CONTROLS—that give accuracy, ease of operation, and flexibility never before available.

8 MODELS—38"x27" to 160"x 47" base working surface.



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MASERATI

DISTRIBUTORS IN PRINCIPAL CITIES

Maserati Corporation of America, Dept. M, Westbury, N. Y.

For more data circle **501** on Reader Service Card

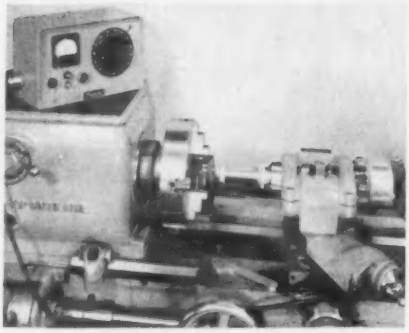
work stations, allowing the gas to enter through the top, spreading over a diffusion plate and escaping through the bottom. The glass bells are counterweighted to move freely on the posts to facilitate the handling of the work. In the accompanying illustration, the bell on the left is in a loading position and the bell on the right in a heating position. The heating cycle is automatically controlled at each station by pre-set timers thus enabling one operator to work all three stations.

For more data circle 132 on Reader Service Card

★ ★ ★

HEAVY-DUTY POWER QUILL

The Precise Products Corp., 1345 Clark St., Racine, Wis., has announced its Super 80 high speed power quill.



View of Precise Super 80 Power Quill unit

This multi-purpose tool develops a full 1½ h.p. at the quill and provides a continuously variable speed range from 7,000 to 25,000 r.p.m. A compact electric speed control with a simple dial permits easy selection of exact speed desired. The control also provides a voltmeter calibrated in r.p.m.'s, mas-

Specify KASSON Precision Collets and Attachments

3AT, 3C, 1A, 4C, 5C

480 (AC-50) PUSH TYPE. All collets in hexagon, square and round for lathes, milling machines, attachments.

KLUTCH-KOLLET Step collet. Accurate chucking to 2¾" dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

FOR ATLAS • LOGAN • SOUTH BEND • CRAFTSMAN • SHELDON LATHES, ETC.

LEVER-TYPE DRAWBAR ½" cap.

Positive grip on undersize, oversize or standard diameter work. Patented coordinate cams eliminate fingers.

LIVE CENTER (Ball Bearing). Double sealed for accuracy.

HAND DRAWBAR ½" cap.

Let us quote on your quantity orders for any types of collets, live center or other machine tool attachments!

KASSON Precision PRODUCTS

IMMEDIATE DELIVERY FROM STOCK

Guaranteed unconditionally. Distributors inquiries invited.

WRITE FOR FREE LITERATURE

KASSON DIE AND MOTOR CORP.
32-14 Northern Blvd. • L. I. City 1, N. Y.

For more data circle 502 on Reader Service Card

SPECIAL MILLING CUTTERS

PLAIN STYLE • ANGULAR • FORMED
CONCAVE • CONVEX
STAGGER TOOTH • SIDE MILLING

Prompt Quotations, Competitive Prices

Agents' and Jobbers' Inquiries Welcome

QUALITY TOOL WORKS

792 S. MARKET ST. • WAUKEGAN, ILL.

For more data circle **503** on Reader Service Card

Attach this page to your letterhead and we will forward our new 16-page catalog to you.

CONICAL TOOL CO.

3801 Buchanon S.W., Grand Rapids 8, Mich.

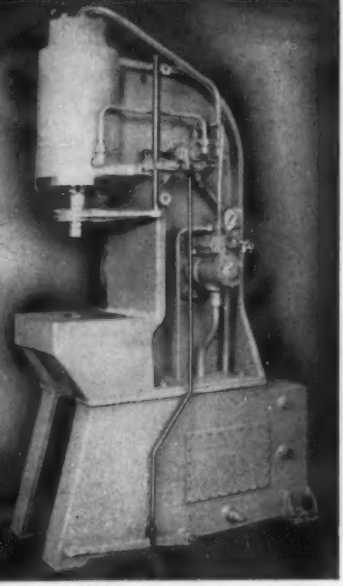
For more data circle **504** on Reader Service Card

Greenerd

HYDRAULIC PRESSES

for
- ASSEMBLING
- BROACHING
- FORMING
- MOLDING
- STRAIGHTENING

Hydraulic presses made to conform to J.I.C. standards. Pictured at right is 15-ton hydraulic press.
Write for Catalog 554.



GREENERD ARBOR PRESSES

NASHUA • EST. 1883 • NEW HAMPSHIRE

For more data circle **505** on Reader Service Card

ter-switch, pilot light and a fusetron for overload protection.

Standard equipment includes a precision collet chuck with a capacity to ½ inch. A solid quill extension accommodating wheels with up to ½ inch i.d. and 2½ inches o.d., is also available. Specially designed mounts, either universal or plane type, are offered by the manufacturer to permit easy mounting of the quill to larger machine tools such as milling machines, tool and cutter grinders, lathes, and surface grinders, in either single or multiple operations. A high speed, universal motor, operated from standard 115 volt power supply, five grease sealed micro-precision ball bearings and a rigid accurate quill, all contained in a strong one-piece steel housing, permit milling, grinding or finishing to tolerances of 0.0001 inch. A built-in filtration unit protects the micro-precision bearings and insures long life, especially when used in protection set-ups.

For more data circle **133** on Reader Service Card

★ ★ ★

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Acme Broach Corp., Milan, Mich., has designed and developed automated broaching equipment for use by a leading automobile builder for uninterrupted, continuous, high production of internally broached splines in transmission components. The parts to be broached are supplied to this machine from customers conveyor line and are automatically broached two at a time and ejected to a continuing conveyor.

The accompanying illustration shows the broaching machine completely tooled for this operation. The basic ma-

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HEIMANN TRANSFER SCREW SETS

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Frictionless —Rotary
For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.
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FLAT TWISTED AND ROLLED SECTION

Unexcelled in Quality and Performance! • SINCE 1903

HI-DUTY *Flat-Twisted* and *Rolled Section* Drills are produced by forging and hot twisting bars of high speed steel. This method improves the structure by preserving the grain of the steel. Sizes range from ½" to 3¼" and larger. Milled type drills are also available—from 1/64" to ½" diameter. Hi-Duty means long-lasting economical service!

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We manufacture a large variety of *special types* of high speed drills—special diameters and lengths; also step drills.

FAST DELIVERY . . .

We can make immediate shipment from stock on many special drills! *Contact your Industrial Supplier . . or write today for Catalog and Price List.*

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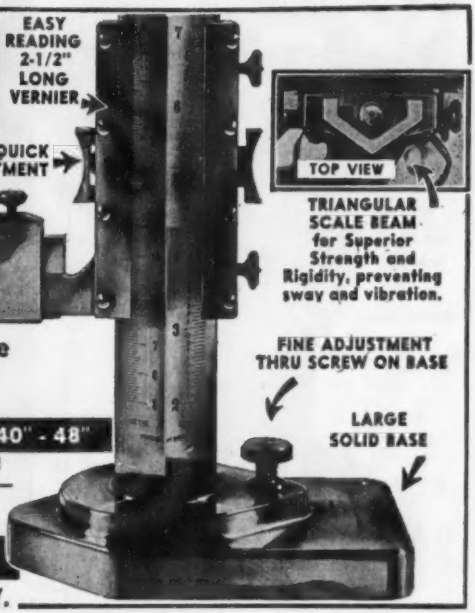
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to cut Keyways when a DAVIS KEYSEATER

will do the job so much quicker and better?

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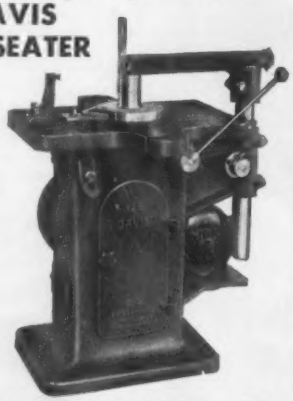

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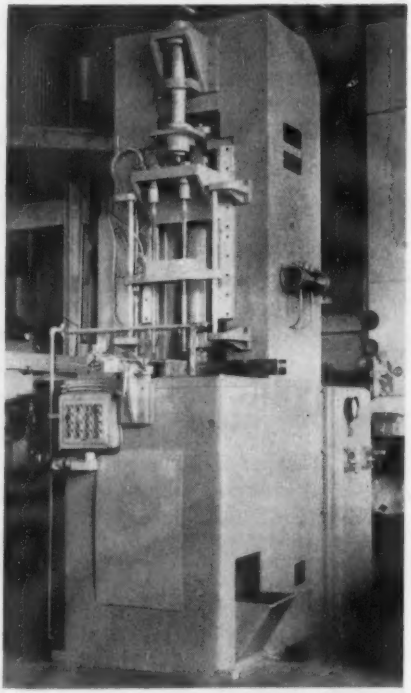
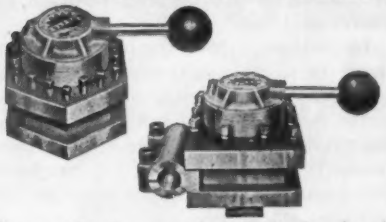
chine is an Acme VPD-10-36 vertical pull down internal broaching machine equipped with broach handling cylinder and automatic cycle for electrical operation. An automatic fixture feeds parts from left to right and are pushed in front of loading slide. The loading slide then pushes two pieces at a time under broaches at which time broaches move downward through bores in work parts and are drawn through cutting stroke while loading slide returns outward. After broaches have reached end of downward stroke and are clear of parts, the left to right slide again moves out pushing two completed



View of Acme Automated Broaching Machine

"WEDGE-LOCK" TURRET



Does not raise up when indexing in all 12 positions. 4-way and 6-way block models. Repetitive accuracy to within .0003 plus or minus within itself.

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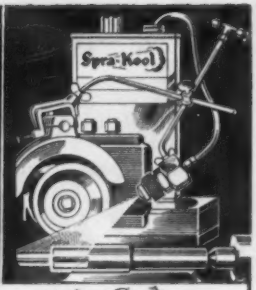

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COMPLETELY ADAPTABLE — no bulky equipment. Easily installed on any make of machine.
SIMPLE SPRAY ADJUSTMENT — from fine dry to heavy moist spray . . . no fuss or muss.
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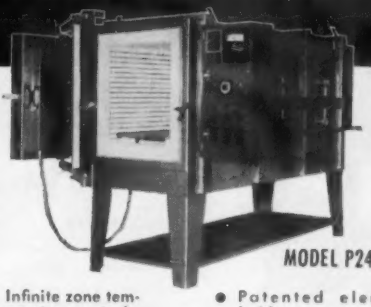
dyna-trol ELECTRIC FURNACES

MODEL NO.	FIRING CHAMBER (H.W.D.)	PRICE (300° to 2000°)	PRICE (400° to 2300°)
P46	4½"x4½"x6"	$90.00	$110.00
P79	6"x6"x9"	$205.00	$225.00
P918	9"x9"x18"	$480.00	$528.00
P414	14"x14"x14"	$525.00	$603.25
P124	12"x12"x24"	$715.00	$822.25
P818	18"x18"x18"	$775.00	$887.50
P136	18"x18"x36"	$1125.00	$1312.50

Automatic Controls Available on all Models



MODEL P2472-1

MODEL P-79

- Infinite zone temperature control.
- Zone temperature indication by Pyrometer Selector Switch.
- Automatic hold and cut-off instrument available.
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parts out of the way and bringing additional parts in front of loader slide. The ejector slide then returns back to the left at which time broaches are returned upward through open bores and picked up and raised clear of work part so that two additional parts may be pushed into broaching position by loader slide.

In production use, the machines continue to cycle automatically, feeding, broaching and ejecting the completed parts. A selector switch allows for manual cycling for setup and checking purposes. It is said that this unit produces 250 completed pieces per hour at 100 per cent efficiency.

For more data circle **134** on Reader Service Card

★ ★ ★

MODERNIZED GROOVERS DESIGNED FOR SPEED AND OPERATING EASE

Niagara Machine and Tool Works, Buffalo 11, N. Y., has announced its modernized groovers, featuring multipurpose horns for closing both single and Pittsburgh lock seams. Niagara Model 48-U universal power grooving machine is modernized and equipped for accuracy, speed and operating ease.

Furnished as standard equipment, the newly-designed horn can be easily rotated and locked in any one of several positions for closing single lock seams on inside or outside of square and round work or Pittsburgh lock seams on square work.

Driven by a direct connected gearhead motor, the machine requires less horsepower — hence lower operating cost, no belts, no space consuming guards. Convenient controls enable fast, smooth operation. Adjustable stops

HARGRAVE CLAMPS
A Complete Line of Clamps for all Purposes
Individually Power Tested for Better Performance.

"C", Steel Bar, Quick Acting, Wood Hand Screws, Welders
WRITE FOR FREE CATALOG.
Showing Clamps, Chisels, Punches, Masonry Drills for hand and power hammers. Carbide Drills, Washer Cutters, and File Cleaners.
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BAND SAW ACCESSORIES
. . . mean the important difference of quality. You'll find Carter wheels and guides on virtually all band saws known for top performance and dependable, long life.

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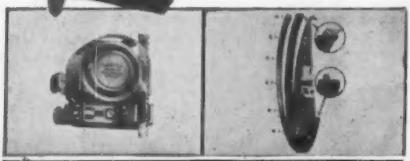
- Demountable Tires
- Micro-Guides
- Guide-Line Lights


CARTER PRODUCTS CO. INC.
426 Wm. Alden Smith Bldg., 30 Ionia Avenue, S. W.
GRAND RAPIDS 2 MICHIGAN

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JIG BORING
and
Large Precision Machining
Done to your specifications
We Have 21 Jig Borers
KIDDE PRECISION TOOL CORP.
18 LOCUST AVENUE, ROSELAND, N. J.

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MARK OF QUALITY

STANDARD MACHINE KEYS

We are able to furnish the following types of finished machine keys of any size and taper: Gib head taper keys, Plain taper keys, Straight keys, Round end feather keys, and Tit keys. We can supply you quickly with the quantities you need at the specifications you require.

Send for new catalog giving complete information on Woodruff keys, taper pins, machine keys and machine racks.

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Plants: Beaver Falls, Pa.; Hammond, Ind.

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AUTOM

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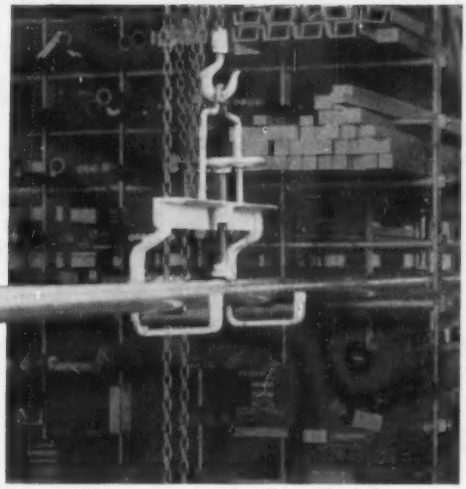
EASIER to move Bar Stock with BAR-LUGGER!

store and remove bar stock 60% quicker



- BAR-LUGGER saves time; is "great" for speeding production.
- STORE and remove up to 6" hex, square or round stock. Handles up to 2,000 lbs.
- ONE operator can handle work of three men, in same time.
- SIMPLE hook-up to overhead conveyor. Indispensable—a real work-saver. Rugged.

Available on prompt delivery at $84.50 ea. Literature describes fully. Write Industrial East Co., P. O. 561, Dept. ML, Clifton, New Jersey.

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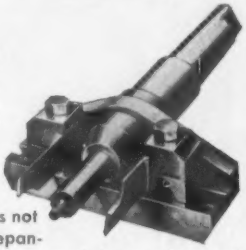
USE THE NEW . . . BOREMASTER

Finished holes 1½" to 11¾" diameter to a depth of 8" on your present equipment.



BOREMASTER is not just another Trepanning Cutter, but a real heavy duty tool. Stock is removed in one piece eliminating waste. Remember . . .

TIME SAVINGS + MATERIAL SAVINGS = COST SAVINGS

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Also without pilot, and shorter shank for Turret Lathes, etc.

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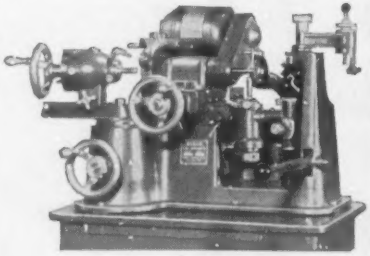
Sharpens Chamfers, Flutes and Spiral Points



MODEL 1100

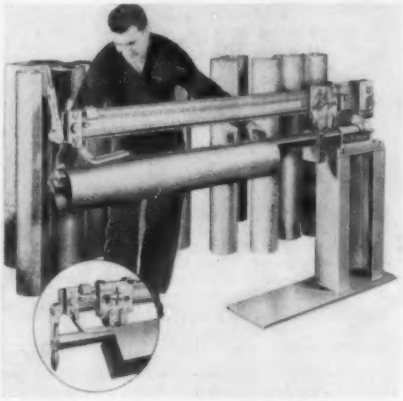
• **Capacities No. 0 Machine Screw to 1½" Hand Taps.**

HENRY P. BOGGIS & CO.

708 E. 163rd St., Cleveland 10, Ohio

For more data circle **524** on Reader Service Card

new shop equipment . . .



Niagara Model No. 48-U Power Groover

hold work stationary on the horn and adjusting wheels enable close regulation of roll pressure to conform with thickness of material.

With a nominal working length of 48 inches, the machine has a single lock seaming capacity of 20 gauge mild steel and a Pittsburgh lock seaming capacity of 18 gauge mild steel.

The line includes also hand operated and giant power grooving machines. Each of the giant power groovers is equipped with operating controls conveniently located at both ends of the machine and an endless chain drive which returns the carriage to starting position automatically. With six models available for single or Pittsburgh lock seaming, the giant power groovers can be obtained with working lengths from 4 to 10 feet for handling mild steel up to 16 gauge.

Featuring simplified construction for long hard usage, the Niagara Model No. 259 Hand Grooving Machine has a nominal working length of 36 inches and a single lock seaming capacity of 22 gauge mild steel.

For more data circle **135** on Reader Service Card

To Save You HOURS of Detailing Time...

A New Extended Range of O. D. Symbol Listings For ECONOMY *Bushings*

ECONOMY'S new "Dimensional Data Sheet No. 7-A" includes an *extended range* of Standard Drill Jig Bushings by symbol listings up to 5" O.D. by 5" in length.

This eliminates all need for detailing. You specify by symbol and hole size only.

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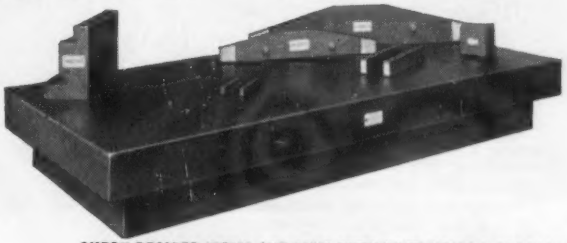

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☐ Microflat Technical Manual
☐ How To Calibrate Plates
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For more data circle **526** on Reader Service Card

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$13.50

No distortion — even on 1/8" stock!
MODEL "C"

For small production runs on 1/8" to 1" stock. Exclusive screw design gives perfect knurl pattern. Furnished with 3 hardened knurls of standard 1/2" dia. Forged steel frame is self-centering. Write for illustrated folder.

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ROCKWIN MANUFACTURING CO.

• 80-D Magnolia St., Westbury, L. I., N. Y. •

For more data circle 527 on Reader Service Card

WALLS TU-WAY BELT SANDER

USE IT EITHER WAY

VERTICAL

At last, a top quality industrial sander that provides all the most wanted features – yet sells for so little. $89.95 complete with cord, plug, switch ready to use

Illustrated Literature on Request

A few desirable distributor territories still available.

WALLS SALES CORPORATION
333 Nassau Avenue Brooklyn 22, N. Y.

For more data circle 528 on Reader Service Card

new shop equipment . . .

PORTABLE DUST COLLECTING UNIT

A square-type, portable DusKolector has been announced by Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich. Known as the Model 40, using a ½ h.p. motor and mounted on casters for easy portability, the unit is said to be ideal for capturing dust from medium size grinding equipment. It also performs efficiently with drill presses, lathes, milling machines, surface grinders, and similar type equipment, when these tools are used for high speed machining of cast iron.

The unit is described as low in cost, compact, efficient, and requiring a minimum of space. It can be "tucked in" around machine tools. Cabinet size is 25 inches wide by 22 inches deep by 28 inches high. Shaft with hand knob provides convenient means of shaking filters for cleaning and without removing them from cabinet. Front panel can be easily removed for ready access to the replaceable fiber glass filters and dust pan in the bottom of cabinet.

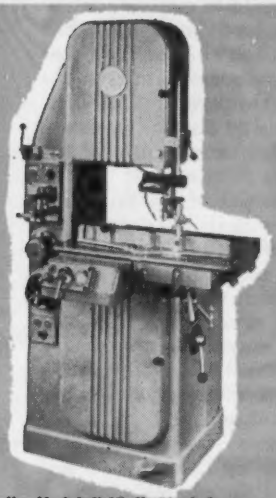
View of Hammond Model 40 DusKolector

$1.00 BUYS ANY MACHINE

upon termination of 3 year Rental Plan

OUTSTANDING NEW MACHINERY at lower cost!

LIBERAL TERMS



Kalle Model K-16 Vertical Contour Metal Cutting Bandsaw

Cutting speeds from 33 to 2400 ft. per. min. Table swivels 15° on four sides.

$1495.00

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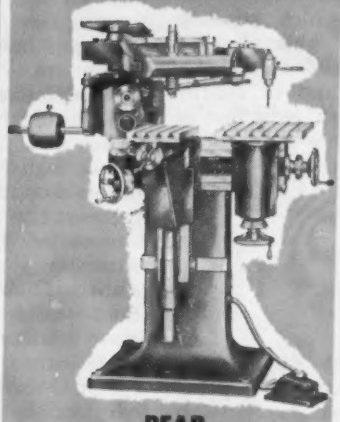
PEAR 3 and 2 dimensional Pantograph Engravers



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3 Dimensional
Model PF/2
$2695.00

PEAR
2 Dimensional
Model CG/3
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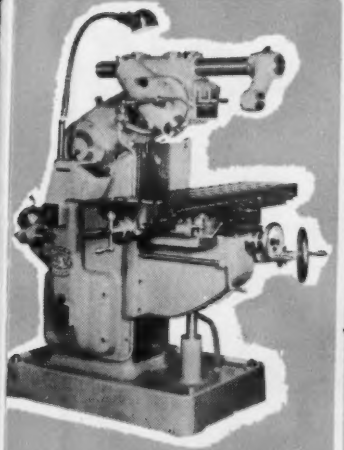

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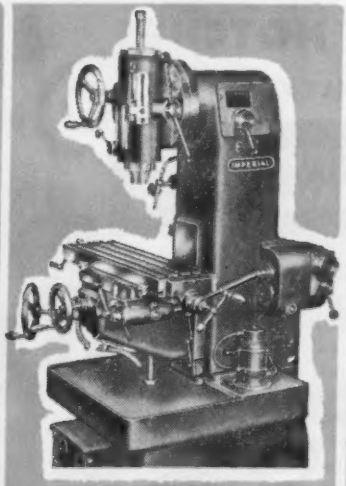
Combined Vertical-Horizontal
MILLING MACHINES
$3990.00



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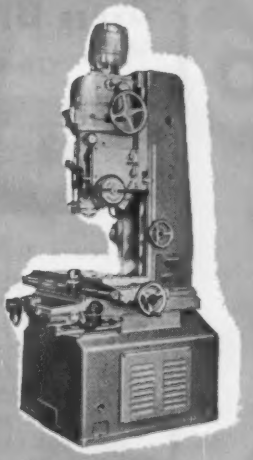
VERTICAL MILLING MACHINE
$1595.00



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Optical Jig Borer

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Branches at: Buffalo, N. Y.; Mineola, N. Y.; Los Angeles, California

See Page 57

With two inlets, the unit has a capacity of 700 c.f.m., and can be used with two size 16 x 2 inch grinding wheels or two 4 inch wide abrasive belts. Advantages claimed are protection of the operator and of nearby tools from abrasive dust, reduction of cleaning and maintenance time, longer tool life, and rapid repayment of the original investment.

For more data circle **136** on Reader Service Card

★ ★ ★

LOW TEMPERATURE CHILLING UNIT

A low-temperature chilling machine with a 4 cubic foot chamber has been developed by Cincinnati Sub-Zero Products, 3930 S-6 Reading Rd., Cincinnati 29, Ohio. The unit, known as Model SU-120-4, is designed for laboratory testing in regard to quality control and product development uses. It has a net thermal capacity of approximately 600 B.t.u. per hour at minus 120 deg. F., with a temperature selection ranging from plus 80 deg. F. to minus 120 deg. F. and full-range pull down in 45 minutes.

Outside dimensions of the unit are: 59 inches high by 25 inches deep by 26 inches wide. The chilling chamber, 18 inches high by 18 inches wide by 17 inches deep, is made of electric-welded, pressure-tite 14-gauge steel, hot dip zinc-coated to specifications of the American Hot Dip Galvanizers' Association. Rounded corners offer additional safety and strength. The net clear working area is 18 inches high by 18 inches wide by 12 inches deep.

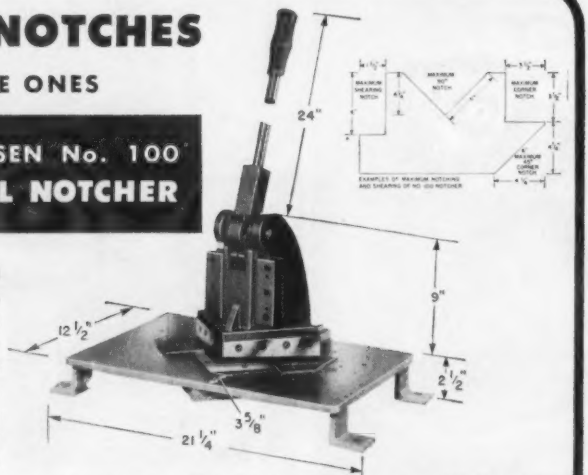
Full access to the chamber area is provided by the front opening door, which has a 12 inch x 12 inch multipane frostproof window. The door's positive

MAKES **BIG NOTCHES**

OR LITTLE ONES

WHITNEY-JENSEN No. 100
HAND METAL NOTCHER

Capacity, 90° notch 4¼" deep in 16-ga. mild steel. V-ram with adjustable gibs assures positive blade and die alignment. Aviation type bearings for smooth and easy operation. A useful, versatile tool for any metal shop.



WHITNEY METAL TOOL COMPANY
720 Forbes St., Rockford, Ill. Since 1910

For more data circle **530** on Reader Service Card

triple seal is assured by three gaskets, two of sponge rubber, the third balloon-type. The chrome latch operates with the touch of a finger.

Interior illumination is furnished by a 60-watt Lumilite. An electrically-operated lifetime red light will remain on during normal operation, going off only in the event of power failure.

Refrigerant tubes completely surround the chamber with a blanket of sub-zero cold. The chamber wall is equipped with a Krack Model F-90-BC fin coil and blower, which provides mechanical convection of air and uniform temperatures throughout the chamber. The cascade refrigeration system is electronically leak-tested. By the addition of strip heaters, the temperature range can be extended to plus 200 degree F.

Located at the side of the chilling chamber, conveniently placed to the right of the full-access door, are a 24-terminal panel and U.E.C. temperature

Cincinnati Sub-Zero SU-120-4 Chilling Machine

MESSAGE from the "NO" men of Laminated Shim Company

You lose **NO** time when you use LAMINUM SHIMS...

NO machining!

NO grinding!

NO counting!

NO stacking!

NO miking!

...and **NO** dirt between layers—ever!

LAMINATED SHIMS OF

LAMINUM

SURFACE BONDED... THEY peel FOR ADJUSTMENT

STAINLESS STEEL with laminations of .002" or .003"	**LOW CARBON STEEL** with laminations of .002" or .003"
BRASS with laminations of .002" or .003"	**ALUMINUM** with laminations of .003" only

LAMINATED SHIM COMPANY, INC.

Shim Headquarters since 1913

3311 Union Street, Glenbrook, Conn.

For more data circle 531 on Reader Service Card

control. The Model E-32-N U.E.C. indicating controller, with a range of minus 120 degrees F. to plus 180 degrees F. has the temperature-sensing bulb approximately located directly in the air stream.

For more data circle **137** on Reader Service Card

DOUBLE DISC GRINDING Facilities

Our Double Disc Grinders
Speed Production
and save $$$ by grinding 2 surfaces Flat & Parallel in 1 operation. *TOLERANCES IN LOW TENTHS.* Piece parts may be rectangular or round flat discs, or flimsy castings in any materials.

If so desired, your purchase order buys in addition, *complete machine shop facilities* to manufacture parts to your blueprints or complete assemblies to your specifications.

We service customers from Maine to California

PRECISION DISC GRINDING CORP.

57 MESEROLE AVENUE
BROOKLYN 22, NEW YORK
EVergreen 3-3720

WRITE for BROCHURE

For more data circle **532** on Reader Service Card

TAPER LOCK PUSHER

Allen Collet Mfg. Co., 17720 Clarann Ave., Melvindale, Mich., has announced its Burns style taper lock pusher. It is said that the device is entirely different in that it departs from the friction type and utilizes the taper lock principle. This means the elimination of friction and consequent wear because the pusher wears in and does not wear out. All wear on the gripping surface is compensated by the automatic adjustment of the tapered locking surface resulting in many times the life of the ordinary pusher.

It locks positively in forward direction and opens freely in the opposite direction. After feeding the bar into position, the pusher locks under positive pressure and the bar cannot slip back into the pusher or bounce back from the stock drop, it is claimed.

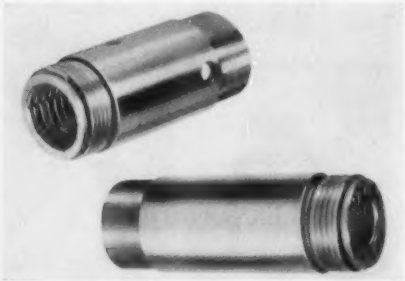
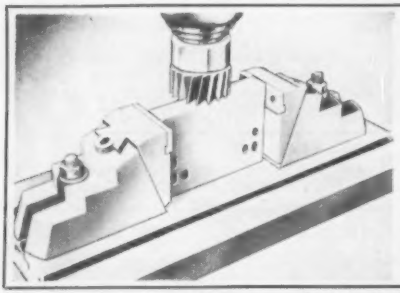


Illustration showing Allen Taper Lock Pusher



MASTER GRIPPING CLAWS System Hubner

WHY use them?

1. Clamping action **Vertical** as well as Horizontal — pressing workpiece **down** directly on the machine table. No hammering and still no air between. **2.** Gain more working room. **3.** Faster and more secure setups. Easier to handle. **4.** Unlimited jaw opening. **5.** No straps overlapping on the workpiece; more machining surface. **6.** Extremely versatile—take light cuts or heavy cuts, use on small machines or heaviest production machines.

Exclusive Agents

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404 4th Ave., Dept. MMS, New York 16, N. Y.

NEISE MODERN TOOLS

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Extra Capacity with

hall COLLET CHUCKS

for SPEED, ACCURACY, ECONOMY

Automatic adjustment speeds up production in multiple operations with push-out type HALL COLLET CHUCKS. Full spindle capacity or over. Tremendous grip over or under stock size. Without adjustments. Shortest overhang. All grip ...no slip. No bearings... no heat or lost power. Instant release without stopping lathe.

SATISFACTION GUARANTEED!

Made in Three Sizes to Fit Your Requirements:

Model A...1" (max. capacity 1-1/16")
Model B...2" (max. capacity 2-1/16")
Model C...3" (max. capacity 3¼")

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HALL MANUFACTURING COMPANY
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CUTTING STOCK DIAMETERS UP TO 40 INCHES?

USE

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(PATENTED)

CUTTING OFF TOOLS

for . . .

- ★ **BORING MILLS**
- ★ **LATHES**
- ★ **PLANERS**
- ★ **SHAPERS**

THE LEADER FOR 14 YEARS

Patented Pivoting Trunnion, Safety-Slip and Support Blade prevent blade breakage and injury to operator. Fast adjustment to lathe center.

Write for free descriptive folder A-1

SKEE TOOL COMPANY
1406 N. FLORES ST.
SAN ANTONIO, TEXAS

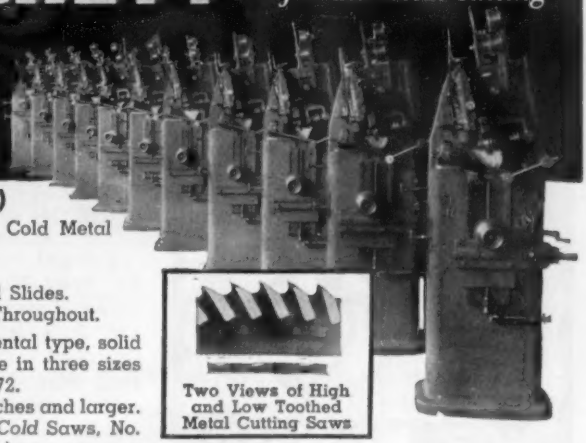
• **Few Industrial Areas Open for Representatives** •

For more data circle **535** on Reader Service Card

HANCHETT

for all metal cutting

Metal Saw Sharpeners



(Hot and Cold Saws)

For Automatic Grinding of Cold Metal Saws.
Rigid — Accurate — Fast.
Ball Bearing Mounted Head Slides.
Heavy Duty Construction Throughout.

For inserted tooth, segmental type, solid tooth circular saws made in three sizes —Models 1130, 1160, 1172.
Saw capacities 8 to 72 inches and larger.
Other Models—Hot and Cold Saws, No. 12 and No. 572 (all sizes).

Two Views of High and Low Toothed Metal Cutting Saws

HANCHETT MANUFACTURING COMPANY

World's Largest Manufacturers of Shear Blade, Knife and Saw Grinding Machinery

MAIN OFFICE—Big Rapids, Michigan **WEST COAST—Portland 1, Oregon**

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SLOCOMB MICROMETERS

MADE STRONGER to LAST LONGER

the new, modernized Slocomb Micrometer has 14 exclusive features that mean greater accuracy and longer wear. New non-glare satin chrome finish on thimble and sleeve. Over 700 different models. Quick repair and reconditioning service.

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HOWALD CARBIDE MILLING CUTTERS

- SQUARE BLADES Easily Replaced.
- Simple, Accurate Blade Adjustment.
- Lowest Blade Cost.
- Cutters from 1½" to 14" dia.

PATENTED END MILL

PAT. SHELL MILL

SEND FOR BULLETIN

W. T. HOWALD MACHINE WORKS

182 SIGOURNEY ST., BROOKLYN 31, N. Y.

For more data circle 538 on Reader Service Card

The taper design enables the gripping surface to expand and contract within a range which fits both hot rolled stock and cold finished stock without change of pusher. The gripping surface automatically adjusts to hold a cold finished bar, a hot rolled bar and also egg-shaped bars, a self-compensating feature.

The pusher opens freely after feeding the bar into position. The free movement return of the pusher without friction eliminates scratching. The positive taper lock which prevents bounce back of bars from the stock stop eliminates all short pieces. The taper lock holds regardless of length and is designed to grip the bar at the end of the pusher, resulting in shorter bar ends and substantial savings of material.

The automatic adjustment of pressure on the bar is such as to carry the bar regardless of length or weight. As a result, bars up to 20 feet and longer, weighing up to 1000 lb. can be used with ease and without strain.

For more data circle 138 on Reader Service Card

★ ★ ★

AIR OPERATED VERTICAL SLIDE ON FLUTE GRINDER

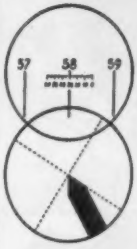
Edward Blake Co., Inc., 438 Cherry St., West Newton 65, Mass., has announced an improvement in its standard flute grinder. The unit is now equipped with air operation of the vertical slide. The air operated slide results in smoother finish, increased output and less operator fatigue. The operator has only to control depth of grind.

The flute grinder has given many tap users a means of controlling rake an-

new SCHERR

TOOLMAKERS MICROSCOPE

WITH INTERCHANGEABLE
DIAL TEMPLETS AND OCULARS



Reading Angles in Minutes

Thread Templets for U. S. National Thread Profiles-6-80 Pitch. Radii Templets, etc.

LARGE MICROMETER DRUMS
READ DIRECTLY IN .0001"

Measuring Range 2" x 1-1/2" and other sizes

A moderately priced PRECISION MEASURING TOOL for Toolroom and Inspection

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Geo. SCHERR OPTICAL TOOLS, Inc.

200-MM LAFAYETTE STREET • NEW YORK 12, N. Y.

For more data circle 539 on Reader Service Card

INCREASE PRODUCTION
WITH SOMMA SUPER
HIGH SPEED STEEL

STRAIGHT
BLADE
CUT-OFF TOOLS

- Super high speed steel greatly increases wear resistance.
- Special non-metallic surface treatment further extends life between sharpenings.
- Precision taper ground for maximum rigidity—faster, cleaner cuts.

The finest circular form tools and cut-off blades are made by Somma. Nation wide distribution. Prices and name of local distributor on request.

Somma TOOL CO., INC. 20 BROWN STREET, WATERBURY, CONN.

West Coast Warehouse: 576 N. Prairie, Hawthorne, Cal.

For more data circle 540 on Reader Service Card

gle on the cutting edges of their taps, and thus enabled them to obtain the correct cutting angle, according to the material to which the tap is used. The machine also corrects any minor errors in the accuracy of indexing, and as a result they get more accuracy, greater uniformity and far more life.

Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS
Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to ¾" U.S.S. Inexpensive — Last for years.

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P. O. Box 1067
Berkley, Mich.

For more data circle **541** on Reader Service Card

BARKER Bench Type MILL
for Production Milling of Small Parts by Unskilled Help
$295.00
As Shown

Screw Feeds Optional at Extra Cost.
Write for Details
BARKER ENGINEERING COMPANY
500 GREEN RD., CLEVELAND 21, OHIO

For more data circle **542** on Reader Service Card

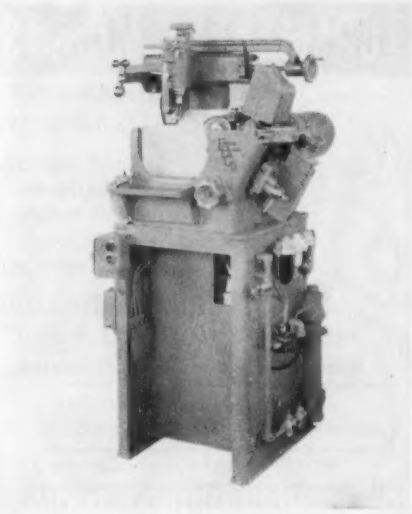

Illustration showing Blake Flute Grinder

The older Blake Flute Grinders with hand operated vertical feed can be converted by the factory, and the air operating mechanism is obtainable when wanted as an optional extra.

The machine permits tap users to resharpen their taps and thus keep a good cutting edge. Previously most tap users found it so difficult to properly grind taps that tap sharpening was not a common practice with the exception of grinding on the chamfer.

For more data circle **139** on Reader Service Card

Make 3 hammers AT ONCE!
It's the NEW, easy, economical, quick way to mold your own lead hammers on a production basis with "SHUR-GRIP" handles and this COOK production mold.
COMPLETE LEAD HAMMER SERVICE
Write for circular and prices
LAWRENCE H. COOK, INC.
67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

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Lewthwaite

Punches & Dies

give exceptional service because . . . .

They are made of carefully selected tool steel and hardened to the test determined point of maximum wearability. • 68 years of experience goes into every tool in our large stocks of standard punches and dies —and it shows! SEND FOR CATALOG SHEETS.

T. H. LEWTHWAITE MACHINE CO.

317 East 47th St. • New York 17, N. Y.

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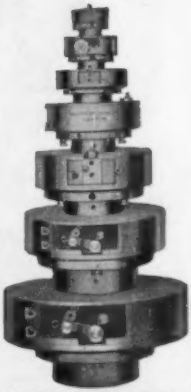
MUMMERT-DIXON

FACINGHEADS

Two-way tool feed in 9, 12, 16, 20, 24, 30, 36, 40 and 46 sizes.

One-way tool feed in 6, 9 and 12 sizes. Automatic feed — convenient tool adjustment — quick feed reverse. Save time and costly set-ups.



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MUMMERT-DIXON CO.

120 PHILADELPHIA ST. • HANOVER, PA.

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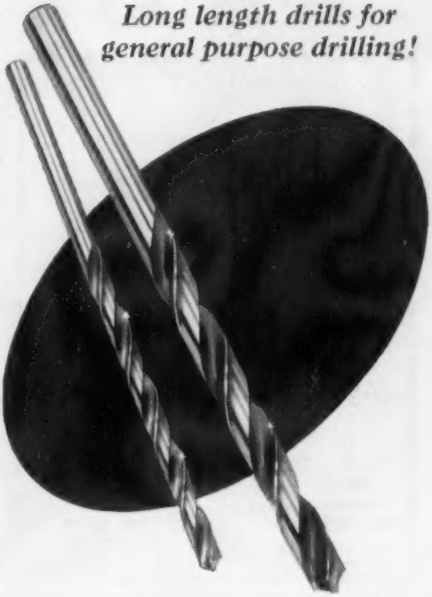
Long length drills for general purpose drilling!



ACE

TAPER LENGTH DRILLS

Feature for feature, you can't beat Ace Taper Length Drills. First, because they're made of the finest quality high speed steel properly heat treated to assure the ultimate in uniform hardness. Second, because they're produced by the Ace-originated "ground-from-the-solid" process to give them smoother, more highly polished flutes with keener, stronger cutting edges. And finally, because they cut faster, last longer, give you more production per drill at lower cost.

Call your local Ace Drill Distributor today!

ACE DRILL

ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

For more data circle **546** on Reader Service Card

PARTS MARKING

includes stamping, printing and many other processes. All are available at ACROMARK—to the extent of their practical use for product marking.

Several different types of standard and special machines for hot or cold process marking can among them provide the answer to your perfect product marking.

Send a sample or drawing of your product for our recommendation at no obligation.

The ACROMARK Company

"The Original Marking Specialists"

Morrel St. Elizabeth, N. J.

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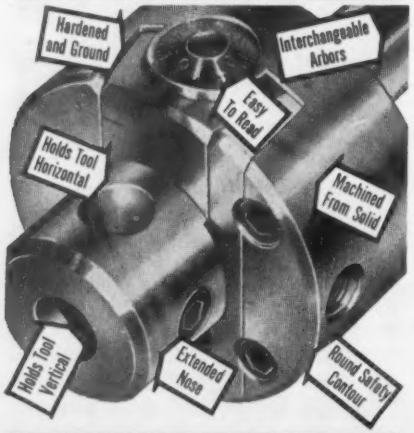
FLYNN BORING HEADS



LEADING NAME IN BORING HEADS FOR 40 YEARS
19 MODELS *Write for catalog*
FLYNN MANUFACTURING CO.
133 FLOWERDALE AVE • DETROIT 20, MICH

For more data circle **548** on Reader Service Card

RADIAL DRILLING MACHINE SPOTS DRILL HEAD OVER WORK

I. O. Johansson Co., 7248 St. Louis Ave., Skokie, Ill., has announced its radial drilling machine. Positioning the drill head without disturbing the workpiece is permitted on this radial drilling machine by a combination of linear and angular ram movements. Mounting the ram on roller bearings provides sensitive linear positioning of the drill head. The tube column raises vertically and also rotates around its axis 360 degrees, providing both vertical and angular positioning. The 360 degree ram rotation permits use of two work stations, one on the adjustable table in front of the machine and the second on the fixed platform at the rear of the machine. Large workpieces are moved on to the rear platform of the machine and smaller workpieces on the 20 by 28 inch table.

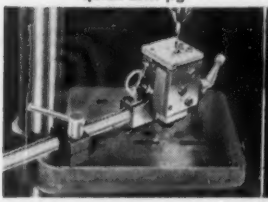
Drill head on the ram can be brought

View of Johansson Radial Drilling Machine

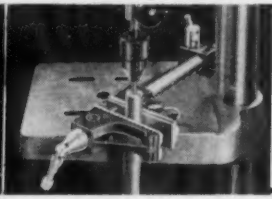
AMF Float-Lock Instant-Change Vise makes drill press COMPLETE MACHINE TOOL

Positive anchoring... "Floats" and "Locks" in any position. Thumb-operated release ring permits instant change of jaw opening. Bosses on 2" centers provided on ratchet jaw for jig plates. Two models... 9" and 12" capacities. Special safety vise for band-saw also available. Send for complete literature now.

quick drill jig



centers long rounds



Another AMF Product

Float-LOCK SAFETY VISES

AMF TOOL DIVISION
AMERICAN MACHINE & FOUNDRY COMPANY
224 Glenwood Avenue, Bloomfield, New Jersey

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GAGE HANDLES and BLANKS

available for immediate delivery

Also available Trilock and Spline Gage Handles

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Double End Reversible Gage Handle

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Established 1938

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Royal Oak Products Co.

28282 John R St. (P.O. Box 161) Royal Oak, Michigan
Phone Lincoln 2-1780
manufacturers of gage handles and blanks

For more data circle **550** on Reader Service Card

up to within 5 inches of column or moved out to drill to center of 52 inch circle. Vertical movement of column permits a maximum of 53 inches from spindle nose to working surface, 3½ inches minimum.

Maximum power is transmitted through geared drive, allowing use of drills up to 1¾ inches in cast iron. Any of eight spindle speeds, ranging from 104 to 1,200 r.p.m. can be selected instantly while machine is running by shift levers which actuate drive clutches. Gears are in constant mesh, eliminating any possibility of gear damage when changing speeds.

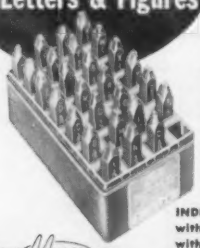
For more data circle **140** on Reader Service Card

★ ★ ★

HEAVY-DUTY DRUM DISPENSER

Coolant Equipment Corp., Verona, Wis., has introduced its CeCOR Model 76 Drum Dispenser. Effortless handling of drums weighing up to 1,000 pounds and transferral of oil and coolants directly from the drum are the outstanding features of the unit. A fully adjustable clamp grips chime of all standard 55 and 30 gallon open or closed end drums or drums with fully removable head for transporting in an upright position. Positive locking action permits one man handling of open drums of liquid with no danger of spillage. All hazardous aspects of drum handling and liquid transferred are removed as the load is held in balance between the 34 inch width of the heavy service wheels. Operator works with complete safety as the positive locking action is accomplished without touching the drum and the load cannot be released until lever is moved by the operator. Hydraulic pump and ram

10% to 25% MORE SERVICE
with
Mecco SAFETY Hevi-Bevl Letters & Figures



Non-spalling, non-mushrooming features of Mecco Safety Steel give superior service on any stamping job. *Write for Bulletin LF-108.*

INDESTRUCTIBLE PLASTIC BOX with transparent lid furnished with stamps ¼" and smaller.

Mecco SAFETY MARKING TOOLS
M.E.CUNNINGHAM CO.
1051 CHATEAU STREET, PITTSBURGH 33, PA.

For more data circle **551** on Reader Service Card

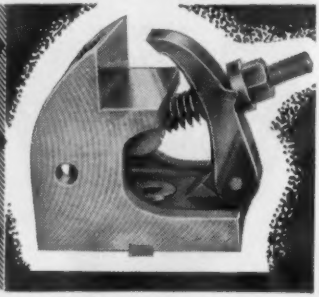
REDUCE Set-up Time and the need for expensive jigs & fixtures

HART MILLING FIXTURES

"Masters of A Thousand Set-ups"

Write for illustrated Folder

Value proved by years of use.
WALTER W. FIELD & SON, INC.
39 Hayward St., Cambridge 42, Mass.



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CENTERLESS AUTOMATION

WE WILL MAKE YOUR CENTERLESS GRINDER COMPLETELY AUTOMATIC... now...any part being ground on a centerless grinder can be fixtured to be **automatically fed** into the machine and ground to size, shape or form... with the grinding process continuously under gauging control. For information, write . . .

JEDCO INC.

Jessup Engr. & Development Co.
3980 Superior Ave., Cincinnati 36, O.

For more data circle **553** on Reader Service Card

Put Muscles In Your Lubricants

MOTOR MICA

ANTI-FRICTION COMPOUND

A clean white powder. Improves cutting oils. Dies last longer. Solves tough lubrication problems. Ask for free sample.

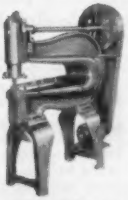
SCIENTIFIC LUBRICANTS CO.
3469 N. Clark St. Chicago 13, Ill.

For more data circle **554** on Reader Service Card

NIBBLE *Your* COSTS WITH...

SAVAGE NIBBLING MACHINES

- TUBE CUTTING
- CIRCLE CUTTING
- STANDARD NIBBLING
- FREE-HAND or TEMPLATE CUTTING
- SPEED WITH ACCURACY NO SECONDARY OPERATIONS
- SPEED WITH SAFETY NO OPEN FLAME OR SPARKS



Up to ¾" Capacity in MILD STEEL

QUOTATION ON REQUEST

W. J. SAVAGE COMPANY
SINCE 1881
KNOXVILLE TENNESSEE
NIBBLING MACHINE PIONEERS

For more data circle **555** on Reader Service Card

Expensive Equipment IS NOT NECESSARY *To Remove Broken Taps*

The majority of broken taps, which cause such a waste of time and production, ***can easily be removed*** without resorting to expensive machines.

WALTON TAP EXTRACTORS

REMOVE BROKEN TAPS QUICKLY • EASILY • INEXPENSIVELY

2, 3, 4, 5, 6 Flute Styles. In Sizes No. 4 to 1½".

This inexpensive **WALTON *Specialized* TOOL** will back out most broken taps, without damage to threads or the work. It has proved its value by its extensive and continued use throughout the metal working industry.

Write us, or simply attach this advertisement to your letterhead, to receive descriptive Data Folder #10, giving sizes, prices, and complete specifications of all **WALTON *Specialized* TOOLS.**

The WALTON Company HARTFORD 10, CONN.

For more data circle **556** on Reader Service Card

lifts loads to convenient height for transporting.

The dispenser is equipped with a hand operated 10 g.p.m. one-way pump for transferring oil, coolants and solvents directly from the drum to the machine tool. Gallon stroke, meters and two-way pumps as well as electrically operated models may be specified.

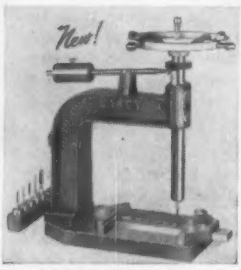
For more data circle **141** on Reader Service Card

View of CeCOR Model 76 Drum Dispenser

★ ★ ★

ANGLE SCREWDRIVER

Albertson & Co., Inc., Sioux City, Iowa, has introduced an electric angle screwdriver. This new tool will drive or remove wood screws, self-tapping screws, lag screws, machine screws and nuts. It is offered with a positive or adjustable clutch. The positive clutch pro-



LASSY

Supersensitive Hand Tapper

New exclusive features and top quality make Lassy Tappers outstandingly the finest available. Write for illustrated circular showing 3 models, and also Universal Tap and Die Guide.

LASSY TOOL COMPANY, Plainville, Conn.

For more data circle **557** on Reader Service Card

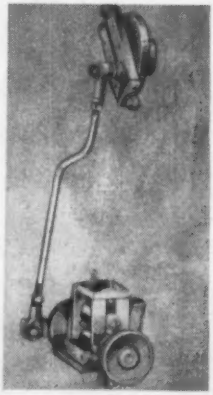
economically priced press room equipment

DURANT

Roll Feeds

Sixteen standard models that take stock from 2" to 12" wide. Insures accurate feeding—reversible — easy to install. Select - O - Matic indexes available on 11 models.

Manufacturers of Stock Reels, Roll Feeds, Straighteners, Scrap Choppers, Die Pullers, Foot Presses, Coil Cradles, Press Guards, Stock Oilers.



WRITE FOR NEW FREE CATALOG

DURANT Tool Supply Co.

PROVIDENCE 3, RHODE ISLAND

For more data circle **558** on Reader Service Card

READING BENCH KEYSEATER

Portable — move directly to job; a time saver for both small and large shops.

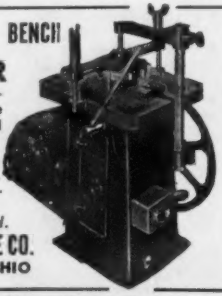
3¾" stroke; adaptable for other work.

Low first cost — prompt delivery.

Good dealers wanted.

READING MACHINE CO.

CINCINNATI 37, OHIO



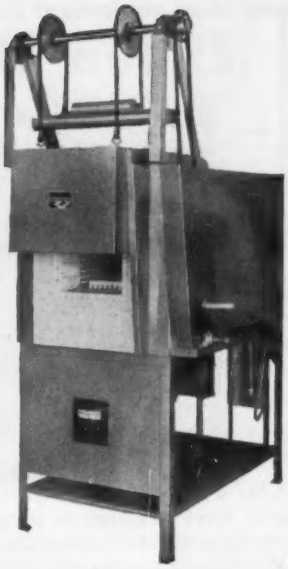
For more data circle **559** on Reader Service Card

"MULTI-INSULATION"

is the secret of . . .

HUPPERT

Floor Model Furnaces



These sturdy production type Huppert electric furnaces not only attain highest efficiency, but also cut operating costs to a minimum through the unique Huppert method of using multi-insulation surrounding all sides of the heating chamber. Heat range —continuous up to 1850° F., intermittent operation to 1950° F., can also be built for 2300° F. operation.

This furnace comes complete with an indicating electronic temperature controller, and a tight seating, wedge-type door is used. Standardly furnished for 220 V. AC single or 3 phase operation. (110 V. or 440 V. models to order).

This model built in 20 different sizes.

Model No. 16 illustrated—12"x8"x18"—$1014.00 complete

Write for literature on complete line of Huppert furnaces and ovens.

K. H. HUPPERT CO.

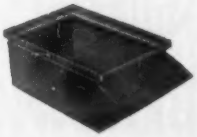
6841 Cottage Grove Avenue Chicago 37, Illinois

Manufacturers of Electric Furnaces and Ovens

For more data circle 560 on Reader Service Card

HOW ARE YOU FIXED FOR BOXES?

Finding a place for production parts can be inconvenient and time consuming when boxes are unavailable.



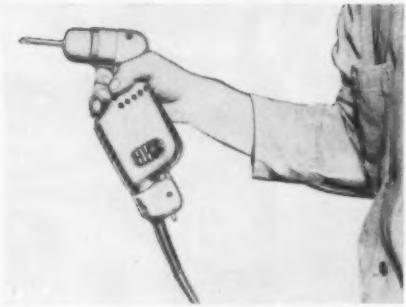
For the best steel stacking box, its Sterling—its top rim construction makes it best.

Sterling makes all types and sizes of steel boxes.

STERLING FACTORY EQUIP. CO.

183 Charles St., Providence, R. I.

For more data circle 561 on Reader Service Card



View of Sioux Electric Angle Screwdriver

vides a free spindle for engaging bit with screw. Operating pressure closes the clutch and continues to drive until resistance is greater than hand pressure.

Where uniform tightness is desired, no matter how much pressure the operator applies, an adjustable clutch is offered. The adjustable clutch operates the same as the positive clutch, except that driving force is predetermined by adjusting the spring load for the desired tightness.

The compact, angle design makes it possible to work in close quarters which might otherwise be inaccessible for a conventional power tool.

The Sioux screwdriver may be equipped with a reversing switch so that it will remove as well as drive screws. Standard screwdriver bits and Phillips screwdriving bits are available for use with angle screwdriver.

For more data circle **142** on Reader Service Card

★ ★ ★

MODIFIED STAMPING FIXTURES

M. E. Cunningham Co., 1051 Chateau St., Pittsburgh 33, Pa., has announced a modification of its GRD

★ ★ ★ ★ ★

CHICAGO

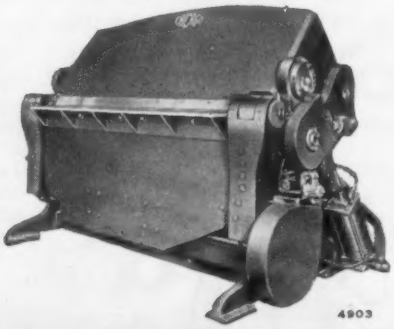
STEEL HAND and POWER

BENDING BRAKES

for Single and Quantity Runs

BENDING STEEL PLATE
and SHEET METAL

Special Bending Brakes
Double Folder Brakes



4903

DREIS & KRUMP
MANUFACTURING COMPANY
7418 S. Loomis Boulevard, Chicago 36, Illinois

CHICAGO
STEEL BENDING BRAKES
BOX and PAN BRAKES
PRESS BRAKES

For more data circle **562** on Reader Service Card

HELIOS
PRECISION DIAL CALIPER

6″
$31.80
F.O.B. New York

Guaranteed Accuracy Within .001″
Reading .001″

- **SPEED**
- **PRECISION**
- **DEPENDABILITY**

Full scale readings of 5″-6″-8″-10″ available. Also Foot with Scriber to convert to Vernier Height Gage.

Ask for catalog and prices of other Standard Calipers.

NEISE MODERNTOOLS
KARL A. NEISE
404 4th Ave., Dept. MMS
New York 16, N. Y.

For more data circle **563** on Reader Service Card

HERE'S THE ANSWER TO YOUR
TAPPING PROBLEMS

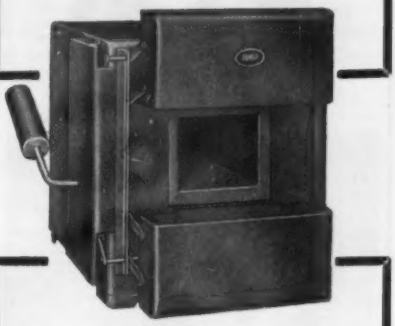
USE
TRU-CUT COMPOUND

Write for complete detailed information *today!*

HURON MACHINE PRODUCTS INC.
6252 MONROE BOULEVARD
DEARBORN, MICHIGAN

For more data circle **564** on Reader Service Card

SAVE HOURS, CUT COSTS



HEAT TREAT SMALL PARTS, TOOLS, DIES, ETC. IN YOUR OWN SHOP WITH A VERSATILE, HIGHLY EFFICIENT TEMCO ELECTRIC FURNACE. Why tie up your big equipment on small heat treat jobs below its capacity, or why "farm out" heat treating of parts, tools, dies? Put a TEMCO bench-type electric furnace in your shop and see how it pays for itself over and over again—in time-savings, cost savings, and production conveniences.

Temco Furnaces are economical to own and operate . . . easy to hook up . . . easy to use. Eight models with chamber sizes from 4″ x 3¾″ x 3¾″ to 9½″ x 8½″ x 18″. $60 to $563 complete with controls. Write for data and nearest dealer's name.

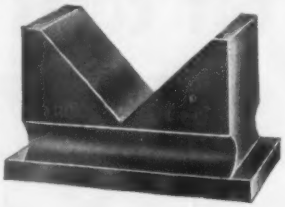
TEMCO

ELECTRIC FURNACES
Thermo Electric Manufacturing Co.
488 Huff St., Dubuque, Iowa

For more data circle **565** on Reader Service Card

SEMI-PRECISION "V" BLOCKS

FOR ALL-AROUND SHOP USE



Stock No.	Base	Capacity	Net Price Ea.
10	4½" x 3"	2¾" dia.	$ 8.00
11	6½" x 4"	4¾" dia.	16.25

Sturdily designed for hard usage . . . Accurately machined from close-grain iron . . . Ideal for drill presses, milling machines, shapers and planers. Will test round shafting for straightness . . . Economically priced.

Write for descriptive bulletin.

ACME TOOL COMPANY

73 WEST BROADWAY • NEW YORK 7, N. Y.

For more data circle **566** on Reader Service Card

PART FEEDER

Automatic Part Feeders are adaptable to production jobs requiring the handling of small parts. Parts poured into hopper are arranged and fed down track in proper order.

Single & Multiple Spindle Magazine Feed Power Screw Driving Machines

For driving screws faster in products assembled with screws. These machines operate easily and require very little attention or adjustment when put in production.

Send sample parts when writing for quotation.

COOK & CHICK CO.

2415 WEST 24TH ST., CHICAGO 8, ILL.

For more data circle **567** on Reader Service Card

stamping fixture, called Style B. The device has been developed for marking around the circumference of sleeves and on the edge of hex plugs of various sizes. It uses cradles for circumference of sleeves and a special table for marking hexes.

Components of the fixture include: cast steel housing, cradles and table for holding parts being marked, roller marking die and a gear-mounted handle. As the handle is turned, the gear arrangement causes the die to move across the piece held in the cradles or table. For marking on the edge of a hex, the table is positioned over cradles. Adjustable gauges are provided to make a nest for holding plugs; screw adjustment on side sets nest in position for making contact with the die.

For more data circle **143** on Reader Service Card

Cunningham Style B, GRD Stamping Fixture along with types of parts which can be marked

AUTOMATIC DRILL PRESS

A drill press, which performs automatic drilling and tapping operations at the flip of a switch, has been announced by The Dumore Co., 1302 Seventeenth St., Racine, Wis. This "Drill-N-Tap" press provides instant changeover from drilling to tapping for long or short production runs. Drill bushings are simply removed when tapping is desired. The tap fits into the chuck with no extra head being necessary. Self-reversing motor, electrically controlled, withdraws the tap by reversing spindle rotation. No clutches are needed. This direct tool approach, the manufacturer states, results in less tool overhang, less tool breakage, lower scrap losses, closer mounting to the work fixture for faster cycling and reduced idling time.

According to the manufacturer, cleaner tapping threads are possible on this press because of the infinite adjustment of both forward and retract air pressures on the two-way pneumatic system, which prevents tearing of top threads when pulling tap out of workpiece. In addition to using standard drills and taps, left-hand drills and taps can be used.

View of the Dumore "Drill-N-Tap" Press

"Best discs we ever used"

Many job reports prove Norton discs add the profit-boosting "TOUCH of GOLD"

Customers performing the widest range of disc grinding operations report that Norton discs outproduce and outlast all others.

Made of ALUNDUM* and CRYSTOLON* abrasives, Norton discs are available in all standard grit sizes, all grinding grades, five types of bonds and all types of mountings. They are precision-built for fast, cool cutting action, extra long service life and closest uniformity.

See Your Norton Distributor for discs that will add the "Touch of Gold" to your own grinding jobs. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas. Behr-Manning Company, Troy, N. Y., a division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

W-1726

NORTON ABRASIVES

Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-cat Tapes
*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

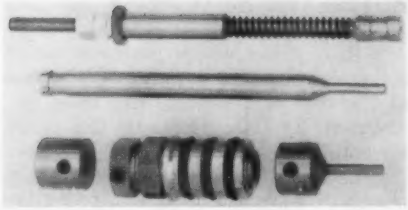
For more data circle 568 on Reader Service Card

The "Drill-N-Tap" press is provided complete with automatic Drill-N-Tap drive head and complete fixture press with rectangular or round table. Hydraulic feed control and electronic cycling for deep hole drilling are offered.
For more data circle **144** on Reader Service Card

★ ★ ★

COLLET STOP FOR SECOND OPERATION AND LATHE WORK

Intended for second operation and lathe work, the Byco 5C Collet Stop, now being marketed by Byco Industries, 2302 E. 31st St., Minneapolis 6, Minn., has a simple self-centering neoprene rubber O-ring mount and an all friction lock. According to the manufacturer, the stop has no thread adjustment, provides for quick change, will not distort the collet and will stay in a fixed position.



Exploded view of Byco 5C Collet Stop

Made to exacting specifications and designed for extremely long life, the Byco 5C Collet Stop, in addition to second operation and lathe work, can also be used in the grinding room, toolroom or wherever a 5C collet is used. Byco stops are also now available for other collets and spindles.
For more data circle **145** on Reader Service Card

SHEARCUTTER UNBREAKABLE TAPS
END TAP-BREAKING TROUBLE

SHEARCUTTER UNBREAKA TAPS
- Are practically unbreakable.
- End tapping trouble.
- Produce better tapped holes.
- Feed the chips out in front of the tap.
- Have an amazing long life.
- May be resharpened many times.
- Require only half the power generally required for tapping.
- Lower tapping costs.

SHEARCUTTER TOOLS COST LESS IN THE LONG RUN
These ultra-scientific cutting tools are used by practically every large manufacturing company in the U.S.A. Constant repeat orders prove their merit and value.
Patent Warning: All Shearcutter Tools are protected by U.S. and Foreign Patents, received, pending or applied for.

SHEARCUT TOOL CO.
MANUFACTURERS OF THE WORLD'S MOST SCIENTIFIC CUTTING TOOLS
7045 Darby Avenue DEPT. C Reseda, California

For more data circle **569** on Reader Service Card

ALL-POSITION PIPE WELDING ELECTRODE

The Lincoln Electric Co., Dept. 3506, Cleveland 17, Ohio, has announced a new E-6010 electrode, Fleetweld 5-P, which is suitable for all E-6010 applications but especially designed for pipe welding applications.

Pipe welding, especially on root passes with a "vertical up" technique at low currents, demands exceptionally smooth arc operation, deep penetration and good bead wash-in. In addition to having these characteristics, the new electrode also provides minimum slag interference, resulting in quick freezing of the molten metal and less tendency for "windows" and porosity. The electrode produces a flat-shaped bead in an even deposit from which slag is easily removed.

The electrode can be used for welding pipe, pressure vessels, X-ray applications and other A.S.M.E. code work. It also is suitable for all-position structural welding, machinery weldments and ship welding. It conforms to A.W.S. E-6010 requirements and has been approved by the American Bureau of Shipping. It is available in 1/8 and 5/32 inch diameters.

For more data circle **146** on Reader Service Card

★ ★ ★

SAFETY SOLVENT TANK FOR CLEANING METAL PARTS AND ASSEMBLIES

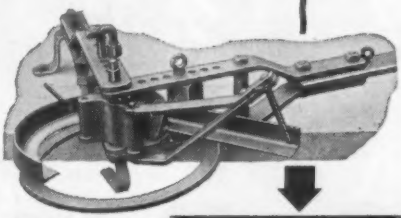
Graymills Corp., 3705 N. Lincoln Ave., Chicago 13, Ill., has announced a safety solvent tank for the safe cleaning of metal parts and assemblies. These safety solvent tanks can be combined in numerous ways to provide a complete, yet low cost cleaning department

THE BENDER'S WORKHORSE:

HOSSFELD UNIVERSAL® IRON BENDER

141 DIFFERENT DIES MAKE IT THE MOST VERSATILE OF ALL BENDERS

For maintenance and limited production work, a Hossfeld Universal Iron Bender wil bend rounds, flats, squares, angle iron, pipe, tubing and conduit. Only one man and one machine are needed. Practical and adaptable, it is quickly set up. Wrenchless, it's always ready for use. Special bending equipment is unnecessary.



OPTIONAL EQUIPMENT AVAILABLE MAKES THE JOB EVEN EASIER

Special dies bend angle iron flange in or out, flat stock edgeways, round or square eyes on flat stock, O.D. tubing, thin wall conduit, 180° and feed—along pipe bends. A Hydraulic Attachment enables one man to make hard-to-pull bends on heavier material.

HOSSFELD MFG. CO.

402 W. 3rd St. Winona, Minn.

GET THE FACTS!

Write for bulletin showing bender models, standard and special dies, and illustrations of bends.

For more data circle **570** on Reader Service Card

for all types of manufacturing operations. All tanks have fusible link safety cover to provide protection in case of fire, and are also built to comply with Factory Mutual Standards.

The tank No. 1-W shown in the accompanying illustration is equipped for air agitation with automatic safety cover. The unit offers maximum economy and efficiency for cleaning parts and assemblies, in solvent, up to 20 inches in width. The space conserving design means that only 15 to 20 gallons of solvent or cleaning solution are needed. Air agitation helps remove loosened soil and gums from all parts to speed the cleaning process. Only 2 pounds of air are required and this is easily controlled by an external valve. A rack is provided to support parts 1½ inches above sludge level and a drain valve is located in the middle front of tank so a bucket or 5 gallon pail can be used to collect the dirty solvent when the tank is drained. Tank is 24 inches long by 20 inches wide by 18 inches deep, made of 14 and 15 gauge steel with gray finish. It provides low cost metal parts cleaning with low initial cost of tank.

For more data circle 147 on Reader Service Card

Graymills Safety Solvent Tank

For VERSATILITY
IN THE SHOP — ON THE JOB

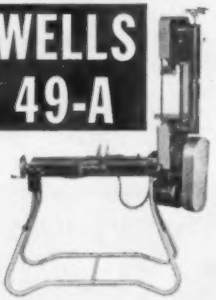
cut it with the **WELLS 49-A**

Here's real versatility in a Metal Cutting Bandsaw. The Wells 49-A is a dual purpose machine designed for shop or "job-site" work—economical to buy—economical to operate. Has 3" pipe capacity.

Use it as a horizontal cut-off saw to handle conduit cutting, bar stock or odd shapes. Swing the head into vertical position and the 49-A converts to an upright bandsaw for cutting angles, slots, notches, bevels and contour work.

The ½" blade is powered by a ¼ H.P. motor—other features include three selective speeds, positive vise action and automatic shut-off after each cut.

Ask your Wells Distributor for full information or write direct.



As a Vertical Bandsaw

For Horizontal Cut-off

Wells

The Pioneers of Horizontal

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORP.
808 Tyler Street • Three Rivers, Mich.

For more data circle 571 on Reader Service Card

OPTICAL COMPARATOR

Opto-Metric Tools, Inc., 137 Varick St., New York 13, N. Y., has been appointed the world wide distributor of the Wilder Micro-Projector. This optical comparator is now available with a new model long range measuring stage. The long range measuring stage reads to 0.0005 inch by means of 1 inch heavy micrometer heads and has a capacity of 1½ x 4 inches; the additional range being obtained by gage blocks. The extra long 4 inch capacity now permits the measuring of pieces up to 4 inches long at one time without relocating the workpiece. This is claimed to not only speed up the measuring operation, but to avoid the possibility of error, which may occur in manually moving the piece.

The Wilder Micro-Projector embodies its popular features of a horizontal workstage with vertical light beam and full range of magnifications.

For more data circle **148** on Reader Service Card

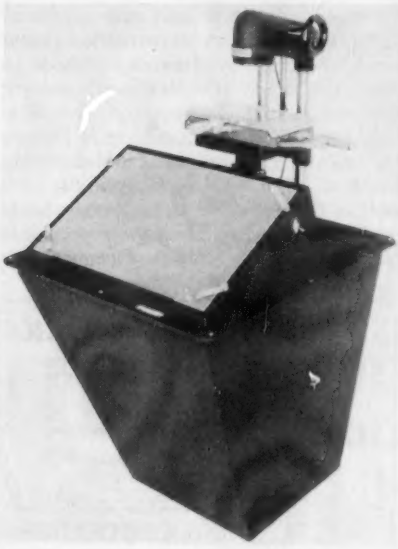


Illustration of Wilder Micro-Projector

THE HELIOS

50 EK VERNIER

CALIPER

6" SCALE HARDENED Guaranteed Accuracy within .001" Double Length Vernier

With Automatic Thumb Lock . . . With all Inch Scales or one Inch and one Metric Scale:

$9.90

The 55 A with set screw lock with one Inch and one Metric scale or all Inch scales:

$8.90

All prices F.O.B. New York

Also available . . .

Dull Chrome finish calipers and Dial Indicator calipers

For details on other imported precision instruments, write

NEISE MODERNTOOLS

KARL A. NEISE, Dept. MMS
404 Fourth Avenue
New York 16, N. Y.

For more data circle **572** on Reader Service Card

CLIPPER

PRECISION DIAMOND TOOLS

Industrial Diamonds
Thread Grinders
Turning Tools
Engraving Tools
Dressing Tools
Diamond Powder

Manufacturers of
DIAMOND WHEELS
and Hones of highest quality.
Prompt delivery.
Ask for literature

Representatives in Principal Cities

CLIPPER DIAMOND TOOL CO., INC.
345-C HUDSON ST., NEW YORK 14, N. Y.

For more data circle **573** on Reader Service Card

HYDRAULIC SLIDE ATTACHMENT

Russell T. Gilman, Inc., 623 Beech St., Grafton, Wis., has announced a hydraulic-operated slide assembly which can be used either as a standard, stock component for special machine construction or as a mass production attachment for toolroom milling machines. It is said any standard toolroom miller can be converted into a semi-automatic production machine in about five minutes with the attachment and its portable power pack. Installation requires only mounting of the attachment on the machine table, attaching hydraulic hose lines and the limit switch electric cable to the power pack, and then plugging the power pack into any 110-volt a.c. outlet. Reconversion

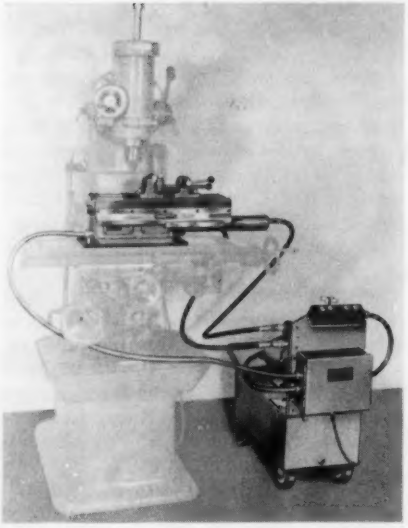
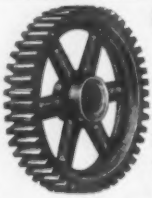


Illustration showing Gilman Hydraulic Slide Attachment with Portable Power Pack



GEARS

In Stock—Immediate Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

Send for Complete Catalog No. 20

CHICAGO GEAR WORKS

440-50 N. Oakley Blvd., Chicago 12, Ill.

For more data circle **574** on Reader Service Card

ALL TOP QUALITY

Hack Saw Blades

and

Twist Drills

AT BIG DISCOUNTS

•

Satisfaction or Full Refund

•

ELISHA PENNIMAN CO.

(Surplus Sales Dept.)

460 South Main Street

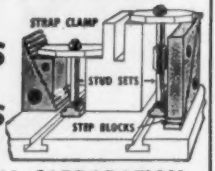
West Hartford 10, Connecticut

For more data circle **575** on Reader Service Card

SURE GRIP STEP BLOCKS

STUD SETS

STRAP CLAMPS



DEPT. SB-1

TIETZMANN TOOL CORPORATION

ENGLEWOOD • OHIO

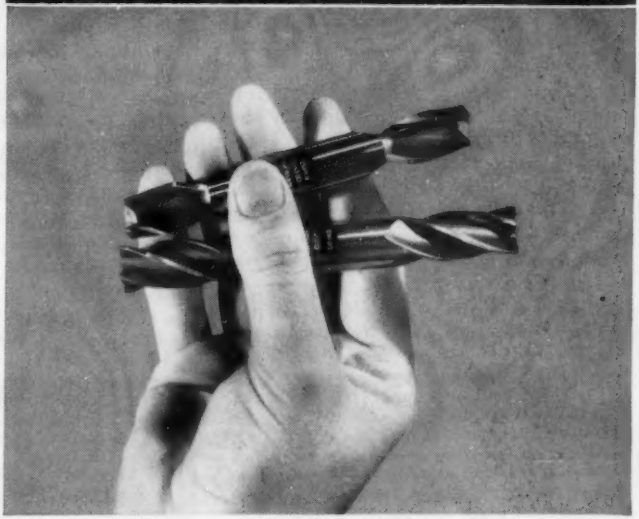
For more data circle **576** on Reader Service Card

of the machine to toolroom milling takes even less time.

The attachment provides a complete cycle of rapid approach, feed, dwell and rapid return, controlled by a single push-button. When the button has been pressed, the cycle functions automatically to completion and stops. Provision is also made for co-ordinating slide movements with automatic work clamping, spindle feed control and the like, to make operation of the milling machine almost fully automatic. The overall stroke is 8 inches. The rapid approach and feed sections of the forward stroke are quickly adjusted to any desired lengths. Rapid traverse movements in either direction may be regulated for any desired speed up to the maximum of 160 inches per minute. Infinite control of the feed rate permits any cutting speed from zero up to the rapid traverse rate.

The forward movement of the slide is controlled by a bar cam attached to the front of the unit. The work approaches the cutter at the rapid traverse rate until the front cam contacts a limit switch, instantly decreasing the speed of advance to the selected feed rate. At the end of the cutting stroke, another cam on the rear of the slide contacts a second limit switch. A time delay of two seconds is then provided to allow the slide table to come to a steel stop, assuring positive location of the work. Following this dwell period, the slide reverses at the rapid traverse rate to the starting point. Again, the table contacts a positive steel stop to

YESTERDAY'S PIONEER . . . TODAY'S LEADER



WELDON Double-End End Mills
FOR DOUBLE DUTY

Weldon Double-End End Mills originally developed by Weldon give you double the service for much less than the cost of two single end mills of equal size. They save production time, too, because to change the mill you simply turn it end for end. Weldon leadership in the cutting tool field has been achieved by many original features which contribute to faster, better performance and longer tool life.

Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.

THE WELDON TOOL COMPANY

3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

For more data circle 577 on Reader Service Card

locate work accurately for the start of the next cycle. The position of the front bar cam on the slide table can quickly be adjusted by the operator to regulate the length of feed stroke for the work being handled. The cam is attached with three set screws.

The unit is engineered to provide smooth, accurate operation, long life and convenience. The slide assembly moves on dovetail ways, fitted with an adjustable steel gib. All sliding surfaces are hand-scraped. Male and female members of the slide assembly are fine-grained gray iron castings, precision machined and ground parallel on the top and bottom surfaces. Two steel positive stops provide accurate location at either end of the slide table. Precision work location without drilling holes for fixture mounting is made possible by a combination keyway and T-slot on the slide table surface. It will receive a ½-inch key or ⅜-inch T-bolts or T-nuts.

The base casting of the slide encloses the two limit switches which control its forward and reverse strokes. Mountings are also provided for two additional limit switches if it is desired to tie in slide operation with automatic work-holding devices, spindle feed movements or similar functions. The attachment is mounted on the milling machine table by means of an adapter plate. This plate is pre-drilled to fit mounting holes of the slide base, and can quickly be drilled to fit table T-slots of any milling machine.

Smooth, positive operation of the slide is assured by an efficient hydraulic cylinder and ample capacity in the self-contained power pack. The cylinder has a 2-inch diameter and an 8-inch stroke. The power pack is a completely packaged hydraulic unit, powered by a ½ h.p. 2½ g.p.m. hydraulic pump and having a 10-gallon reservoir of hydraulic fluid. The control panel includes 4-way and 3-day hydraulic valves, together with other components that are required for full control of the slide table.

For more data circle **149** on Reader Service Card

HOW TO STOP HEADACHES IN THE PRESS ROOM

AND SAVE AT LEAST 10% ON HAND FED JOBS BY USING COIL INSTEAD OF STRIP MATERIAL

STOCK STRAIGHTENERS

ORDER DIRECT on our 10 day money back guarantee

The ONLY low cost stock straightener with all these features:

CAPACITIES—

2″ wide; .010 to .065 in steel, to .093 in soft material.
4″ wide; .010 to .048 in steel, to .065 in soft material.

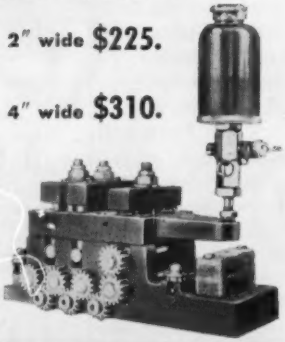
MACHINE DETAILS

1. Built in Stock Oiler with easily replaceable felts, this cleans and oils the material in one operation. 2. Has seven hardened and ground rollers, five for straightening and two for feeding. 3. All lower straightening rollers and the feed rollers are gear driven, thus cuts feeding pressure and protects prepainted and preplated materials. 4. PULLS material through the straightening rollers, WILL NOT BUCKLE THIN MATERIAL, has been used on Inconel, Stainless Steel, Platinum, Phosphor Bronze, and Beryllium Copper. 5. The pressure rollers have adjustable stops, this can save thirty to sixty minutes a day. 6. Has Ball-Bearing Guides at front and back. 7. All gears and moving parts are protected by guards to keep dirt and fingers out.

CAN BE SUPPLIED IN MANY MODELS, motor drive, etc., write for information.

2″ wide $225.

4″ wide $310.



SPERMAN METAL SPECIALTIES

2199 East 21st Street
Brooklyn 29, New York

Manufacturer of "MIGHTY MIDGET" Radius and Angle Dressers

For more data circle **578** on Reader Service Card

NEW MACHINE PERFORMS 159 OPERATIONS

Complete machining of air-conditioning housings from rough castings to assembly is now accomplished by a Transfer-Matic, built by The Cross Co., Detroit 7, Mich. According to the manufacturer, the new machine produces 18 pieces per hour at 100 per cent efficiency. It performs 159 operations; six milling, six boring, one facing, 81 drilling and 65 tapping. Two-position, progressive type, palletized workholding fixtures carry the parts from station to station.

To provide for flexibility in part design changes, replacement and repair, Cross building block construction was used. All parts, even tooling details, are made to interchangeable tolerances for fast and easy maintenance.

Other features of the Transfer-Matic include construction to J.I.C. standards; hardened and ground ways; hydraulic feed and rapid traverse for milling, drilling and boring; and individual lead screw feed for tapping.

For more data circle **150** on Reader Service Card

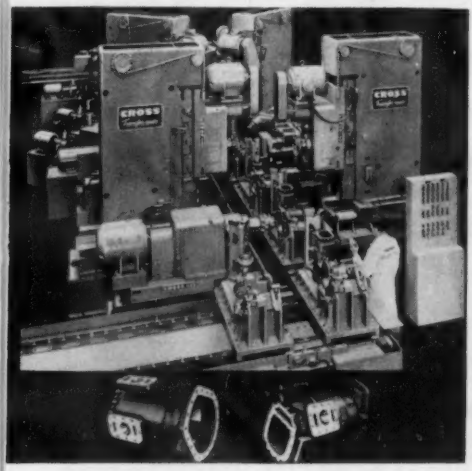


Illustration of the Cross Transfer-Matic which machines air-conditioning housings.

LIVE CENTER ACTION WITH DEAD CENTER ACCURACY

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Free-running on dead centers—with COMPLETE protection. CMD Lubricants are CONCENTRATED, form a "tough" film—absolutely NO GALLING or SEIZING—under the heaviest load. STABILIZED for added "oiliness" giving longer, smoother runs without slip-stick action. It all adds up to LIVE CENTER ACTION with DEAD CENTER PRECISION. The bigger the job, the better you'll like it.

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Send me my order of CMD right away!
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CHICAGO MANUFACTURING AND DISTRIBUTING CO.

For more data circle **579** on Reader Service Card

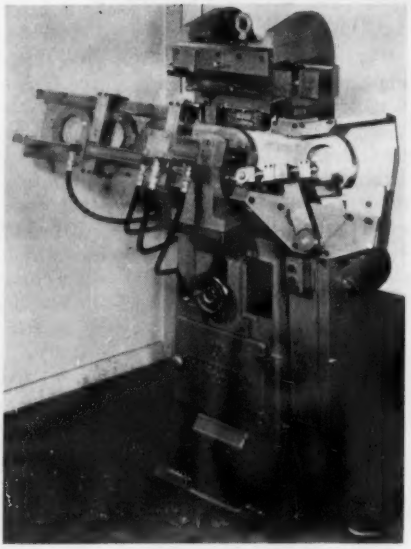
RING GEAR BLANK MARKING MACHINE

Product of Geo. T. Schmidt, Inc., 1806 Belle Plaine Ave., Chicago 13, Ill., the Model 175-S Marking Machine shown herewith is equipped for marking on the periphery of ring gear blanks.

The parts are rolled into a feed chute at the right of the machine from the preceding operation, where they are guided into position at the marking station. The parts are stopped at this point for an instant, during which time a hydraulic stud slips through the bore, thus supporting the gear. Simultaneously, the arbor raises the gear to marking position at the moment the die slide (carrying the lettering tool) starts forward. After marking, the supporting arbor lowers and recedes. A hydraulic arm engages the gear in the bore, carrying it to the discharge chute at the left.

The entire operation is automatic, requiring no operator. Serial numbering for fixed lettering, or both, can be incorporated in the marking tool.

For more data circle **151** on Reader Service Card



Schmidt Model 175-S Marking Machine

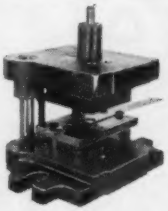
40% SAVINGS

COMPOUND WASHER DIES

Custom Built To Your Size ONLY $157.50

UP TO 2" OUTSIDE DIAMETER

READY TO PRODUCE A MILLION PARTS



Precision Die Set
Stentor Tool Steel
Positive Knock-out
Automatic Trigger Stop
Spring-loaded Stripper

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CHAS. H. ROBB - INDIANAPOLIS

ROB-BILT PRODUCTS

Box 6356-E Indianapolis, Ind.

Guilford Ave. at 48th St.

For more data circle **580** on Reader Service Card

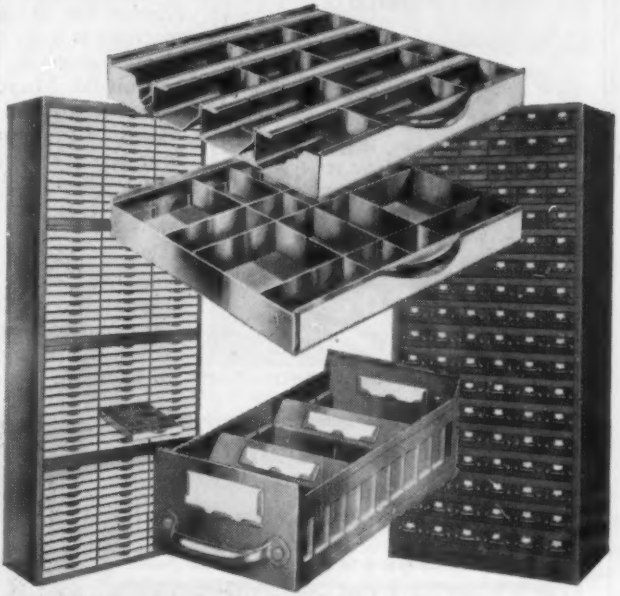
CONTINUOUS MEASURING RECORDING GAGE

Federal Products Corp., 61410 Eddy St., Providence, R. I., has announced its Model 493 B-139 continuous measuring recording gage for checking strip stock as it is feeding to punch presses. The gage is mounted in a wheeled cabinet and is placed between a feed roll and a punch press so that the strip stock goes through the gage before it reaches the press. It can easily be moved from press to press as needed. By checking the stock continuously and observing the meter hand or the recorder chart, the thickness trend of the stock can be followed. The response of the device is deliberately dampened so that local irregularities will not show and the unit will see an average stock thickness. The recorder chart provides a permanent record of thickness variations of each roll of stock which can serve as positive evidence of the condition of any roll. Also, it can be studied for information regarding the effect that various thicknesses have on the finished stampings.

The particular gage shown in the accompanying illustration is adjustable to measure stock from 0.015 to 0.100 inch thick and from 5 to 18 inches wide. The stock passes between two crowned rollers, the bottom one being the refer-

Federal Continuous Measuring Gage

up to 6,184 Drawer Compartments in only 3 sq. ft. of floor space!



Equipto

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Aurora, Illinois

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ence contact and the upper one the sensitive or measuring contact. As the stock varies in thickness, the action of the sensitive contact is transferred to an electronic amplifier which moves the meter hand and pen of the recorder.

The unit is made up of stock components for quick assembly and reasonable cost. Other stock items can be added to the basic components that will enable it to signal the operator with lights or sound signals when bad stock is going through or, as has been done in many cases, it can trip a switch to shut off the feeding mechanism when the stock is out-of-tolerance.

For more data circle **152** on Reader Service Card

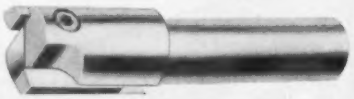
★ ★ ★

INDEXING MACHINE DEBURRS UP TO 350 FINISH MACHINED PARTS

Continuous deburring of finish machined cast iron or non-ferrous parts, at rates ranging from 250 to 350 per hour, is claimed to be attained in production with the new index-type Burr-Blaster for in-line installations. This machine is built by Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 38, Mich. The actual production rate realized depends on both the nature of the part and whether two or four blasting guns are used in the machine. The machine is designed for removal of fragmentary burrs—all those not caused by upsetting of metal.

Parts enter at the front of the machine and either roll or slide down a track to the loading station where they are clamped automatically and firmly by a neoprene mandrel mounted on an air cylinder. Next, the workholding fix-

NEW COMBO-HOLDERS
FOR
Step-Form Milling, Boring, Reaming or End Milling



Use standard size bits, HSS, Stellite, or carbide. Tools ground to same width can be used interchangeably because of closely held slot tolerance.
¾" to 2" diameter in stock. Reasonably priced.

ECONOTOOL CO.
JENKINTOWN, PA.

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BRONZE BUSHINGS:

- For the most exacting requirements
- Made by skilled craftsmen
- Quality controlled by chemical and physical laboratory tests
- Machined on special, advanced design, high production equipment
- Shipped on an emergency basis when you need them

LEADING SUPPLIER TO LEADING USERS

Superior BRASS WORKS, INC.
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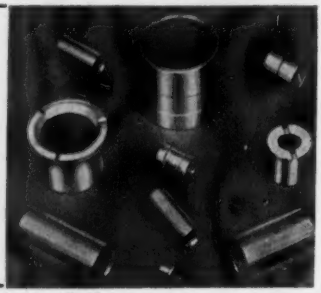


For more data circle **583** on Reader Service Card

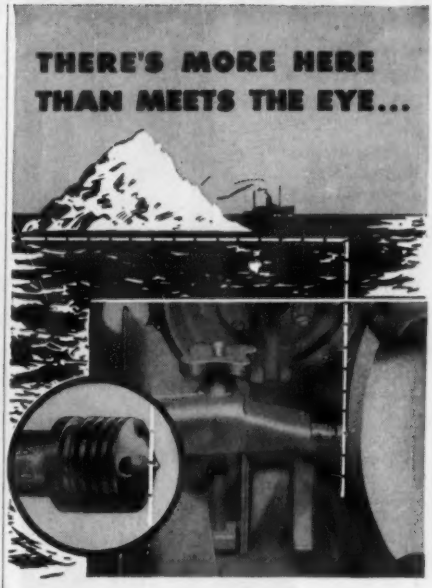
ture is indexed, elevating the workpiece into the blasting cabinet. To insure thorough and uniform removal of all fragmentary burrs, the part is rotated continuously during the entire blasting operation.

Ground up walnut shells and peach pits, silicon carbide, aluminum oxide, steel shot and grit, and so on, can all be used with equal efficiency by the in-line indexing machine. Correct blasting material for a specific job is picked by the manufacturer's engineers on a dual basis: (1) past experience on similar parts and (2) extensive tests in the plant on the actual parts to be blasted.

At the completion of the burr-blasting operation, the part holding fixture is again indexed, this time to the unload station. Here the workpiece is stripped from the fixture and slides or rolls down the exit chute for conveying to the succeeding operation.

Either manual or automatic loading and unloading can be used with the

Modern Index-Type In-Line Burr-Blaster



In an iceberg or in a J. K. Smit Diamond Tool only a fraction shows above the surface.

Everyone knows of the unseen portion of an arctic iceberg. Many do not realize the unseen factors that lie beneath the surface of a J. K. Smit Diamond Tool.

Our constant research to find still better methods of manufacturing Diamond Tools, the unquestioned integrity of our company since 1888, the manufacturing skills that have been learned and passed on through all those years, and quality control of manufacture for tool duplication.

All these hidden assets count much toward maintaining our position as a leader in the industry today.

When *your* next job specifies a diamond tool for any purpose contact J. K. Smit. Our field representatives are trained and qualified to assist you with any standard or special application.

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HOME OFFICE AND PLANT
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A WONT LEAK SWIVEL FOR COOLANT LINES

Try this low cost quality swivel to put the coolant where you need it.

Features the finest materials, an "O" ring seal and adjustable torque

Now order direct for prompt delivery.

½" pipe size $8.75
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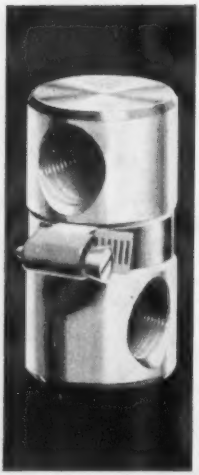


ac AIRDRAULICS COMPANY
1200 N. Fair Oaks, Pasadena, Calif.

For more data circle **585** on Reader Service Card

No. 95A HYDRAULIC PUNCH

Capacity: 12½ ton, 20 strokes per min., ⅝" hole thru ¼" iron, ¾" hole thru 3/16" iron, 2" hole thru ⅛" iron, 10" depth of throat.

Tool operated from front by foot treadle. Operator has complete control over descent of punch.

Low equipment cost in round, square, oval, rectangular and special shape punches.

No. 95B Punch same as shown except without cabinet.

W. A. WHITNEY MFG. CO.
640 Race St. Rockford, Ill.

For more data circle **586** on Reader Service Card

continuous in-line indexing Burr-Blaster. When automatic loading and unloading is used in a completely automatic installation, the Burr-Blaster, it is claimed, does not require an operator.

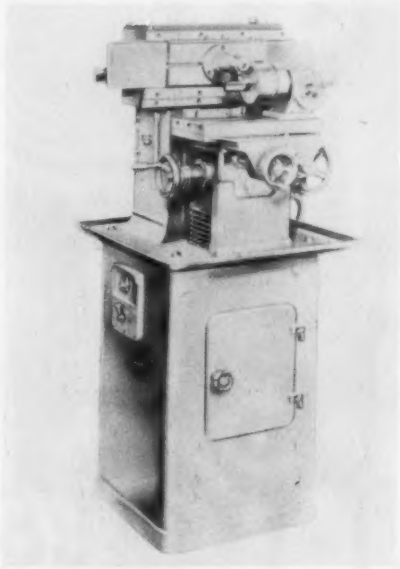
Normal plant air pressures are all that are required for operation of the Burr-Blast machine. Air consumption per gun is 26 c.f.m. at 70 pounds per square inch.

For more data circle **153** on Reader Service Card

★ ★ ★

FORM AND PUNCH SHAPER FOR PRECISION WORK

Jersey Mfg. Co., 442 Livingston St., Elizabeth, N. J., has announced its Jemco K-150 form and punch shaper which produces high precision, close



View showing Jersey Form and Punch Shaper

tolerance punches with curved necks. It is said that punches need no further machining operations when completed on the K-150. All workpieces are clamped directly in a collet holder, between centers or to the co-ordinate chuck. Co-ordinate chuck and indexing attachment guides the workpiece along the contour with one chucking, thus completely eliminating re-chucking errors.

All machining operations can be checked in the shaping process with the special built-in 30 power microscope. This special microscope which is used in the manufacture of extremely high precision punches for instruments, clocks and watches is also designed to readily serve as an accurate measuring device.

For more data circle **154** on Reader Service Card

★ ★ ★ ★ ★

Precise

SUPER 40
CUTS
OPERATION
COST
44%
On
Carpenter's Level
at
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NEW BRITAIN, CONNECTICUT

Our Case History M-101

PROBLEM: To route out casting flash and to de-burr center areas of carpenter's aluminum level.

FORMER METHOD: Hand filing.

PRECISE METHOD: One PRECISE Super 40 Grinder Miller mounted in inverted position under work bench, with T.C. Midget Mill projecting above work surface.

RESULT: A much better, smoother finish and actual cost reduction of 44%!

PRECISE GRINDER MILLERS

Modern Industry's Most Versatile Power Tool

Only PRECISE offers all these features:

Super Speeds up to 45,000 RPM.

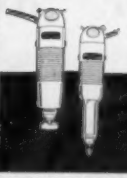
Powerful ¼ H.P. output at precision ground and honed collet chuck, up to ¼" size.

Strong, one-piece aluminum alloy housing, precision machined on inside and outside.

Suited for hand grinding and milling as for mounted applications on standard machine tools.

Complete line of machine tool mounts and accessories available.

Send for Free Catalog containing our complete line of Grinder Millers and Power Quills from ⅛ to 1½ H.P. and their amazing adaptability to modern day precision production.



Precise

PRECISE PRODUCTS CORP.

3745 BLUE RIVER ROAD, RACINE, WISCONSIN

Quality and Precision Since 1882

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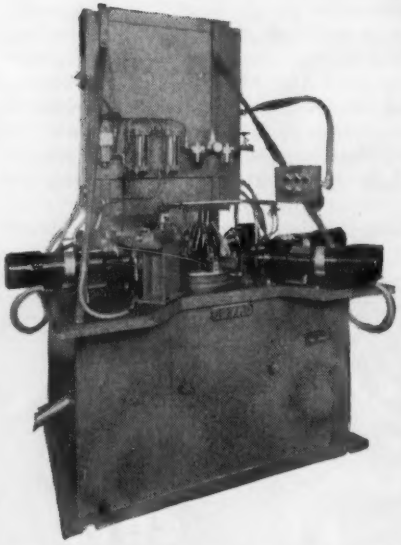
new shop equipment . . .

SPECIAL DRILLING AND TAPPING MACHINE

A machine, developed by the Govro-Nelson Co., 1933 Antionette, Detroit 8, Mich., for an automotive parts manufacturer, incorporates five automatic drilling units, together with a power saw. The machine drills, taps drills, taps, taper reams, slots and deburrs the steel automotive part in the order stated, performing the six operations on 700 parts per hour. The operator merely clamps the part in the machine. All of the operations, including clamping and ejecting, are performed automatically. By making changes in the number and arrangement of the drilling units, the machine is readily adaptable to a variety of operations.



Govro-Nelson Special Drilling and Tapping Machine for producing steel automotive parts

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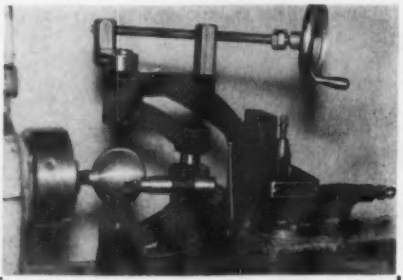

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Convex, Concave or Ball

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The accurate short cut for turning any radius. Adaptable to any lathe. *Write for details.* Territories available for responsible agents or distributors.

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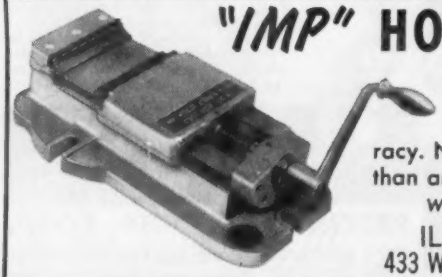

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Chuck work with gage block accuracy. No hammering or fussing. 80% faster than any other holding device.

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433 W. Superior Street, Chicago 10, Illinois

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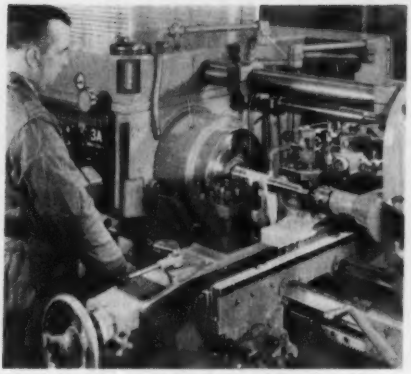
HYDRAULIC CONTOUR TRACING ATTACHMENT

A ruggedly built hydraulic contour tracing attachment, designed for accurate contour turning and cross-center contour facing operations with 3A and 4A extra heavy-duty saddle type turret lathes, has been announced by The Warner and Swasey Co., Cleveland, Ohio. Capable of heavy metal removal in the contour turning and facing of both average and large size workpieces, the attachment is claimed to provide precise control of successive roughing, semi-finish and finish cuts, using a single flat or round template as the master pattern.

The tracing attachment, which mounts at a 45 degree angle on the rear of the 3A or 4A lathe's cross-slide, incorporates a six position, hydraulically operated stop-roll. By presetting the individual stop-screws of the tracer's stop-roll to the desired depths of cut, as many as six successive template controlled cutting passes across the workpiece can be made, without need for any manual cutting tool adjustments by the operator.



Warner and Swasey Tracing Attachment

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The ONLY Live Center On Which Points May Be Interchanged to ±.0001

Points Must Be Ordered With LIVE CENTER To Achieve This Degree Of Accuracy.

Empire Live Centers

Quality engineered for use on lathes, grinders, and milling machines . . . Empire Live Centers are versatile, accurate, heavy duty. Tapered seats give consistent precision alignment . . . assure accuracy of .0001. Positive seal eliminates dirt, grit, cutting oils. Combination bearings absorb both radial and thrust loads.

Manufactured in all tapers: Morse, Brown & Sharpe, Jarno, and straight shank. Special shanks and points to order.

Empire Toolmaker's Set available in handrubbed American Walnut case.

Ask your local distributor or write direct for 26-page Catalog on Live Centers, Collets, Internal Collets, Draw Bars, and Turret Tool Posts.

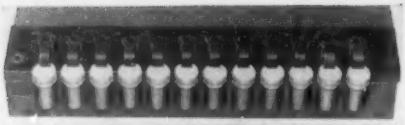
ROYAL PRODUCTS

ROYAL PRODUCTS, 84 Union Street, Mineola, L. I., N. Y. Pioneer 6-4245

For more data circle **590** on Reader Service Card

MULTIPLE GROOVING TOOL

A multiple grooving tool, with twelve ½-inch diameter button inserts, has been developed and fabricated by Kennametal, Inc., Latrobe, Pa., for a special cutting operation which requires the advantages of carbide cutting edges.



View of Kennametal Multiple Grooving Tool

Indexable turn-over button inserts, backed by shims, have a number of cutting edges on top and bottom that depend on the depth of cut. The 8 inch long steel plate that backs up the inserts is claimed to assure accurate groove spacing when inserts are indexed to new cutting edges. Similar tools can be made to other specifications.

For more data circle **157** on Reader Service Card

★ ★ ★

AUTOMATIC HYDRO-MAGNETIC TRACER CONTROL SYSTEM

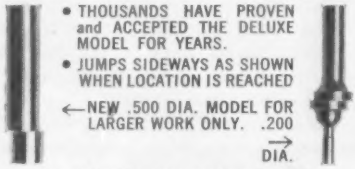
A tracer, which is a magnetic sensing type stylus by which a closed two dimensional or 360 degree contour is reproduced automatically, has been introduced by Turchan Follower Machine Co., 8259 Livernois Ave., Detroit 4, Mich. No control action is required on the part of the operator other than predetermining maximum feed rates. This unit features an adjustable tracer and feed speed range that is said to remain constant along any 360 degree contour during tracing operations. The result is a uniform surface finish.

Adaptable to any standard milling

.0003 HOLE LOCATION IN 1 MINUTE

EDGE FINDERS

$2.50 NEW — POSTPAID except C.O.D. — $10.00 DELUXE



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- JUMPS SIDEWAYS AS SHOWN WHEN LOCATION IS REACHED

←NEW .500 DIA. MODEL FOR LARGER WORK ONLY. .200 DIA.→

ADJUSTABLE VISE STOP

$2.95

HUNDREDS OF PIECES TO A .0003 TOLERANCE WITH THIS HARDENED VISE STOP THAT IS ADJUSTABLE IN ALL DIRECTIONS.

ATTACH TO VISE WITH ONE ¼-20 TAPED HOLE.

Dealer Inquiries Invited

GLOVER MFG. CO.

422 Park Ave. Meadville, Penna.

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MAKE BIG MONEY WELDING WITH THIS LOW COST INDUSTRIAL WELDER

EASY TERMS ONLY $98.50 F. O. B.

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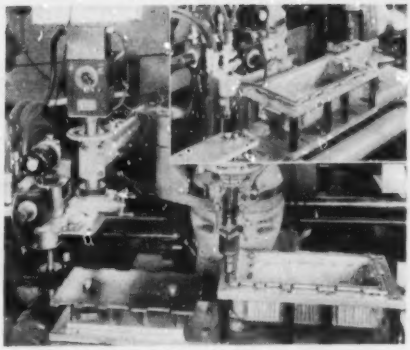

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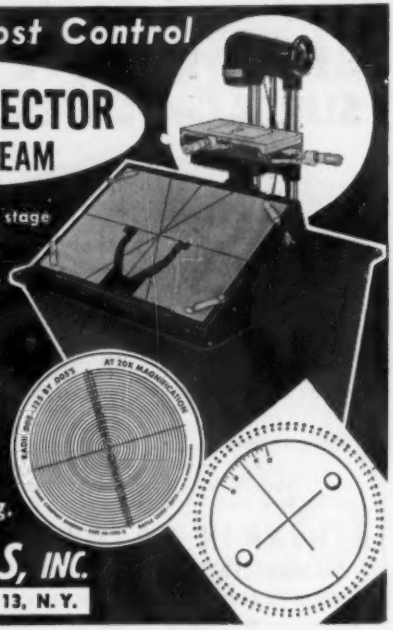

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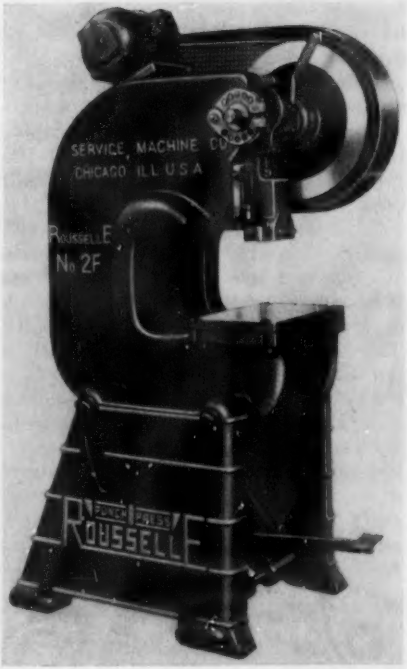

View showing Model No. 2F Rousselle Press

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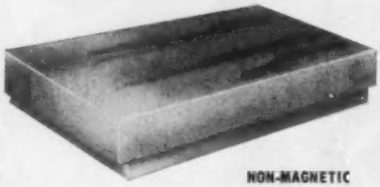

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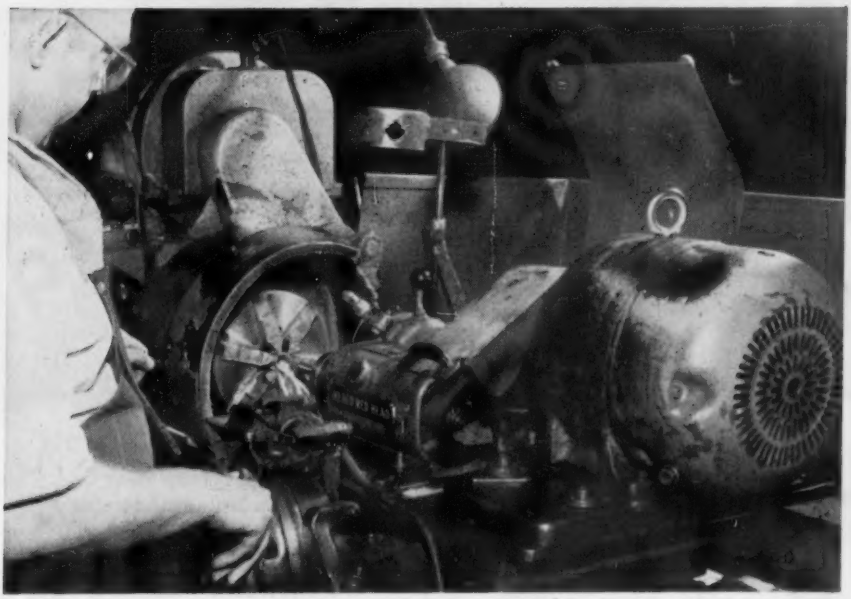

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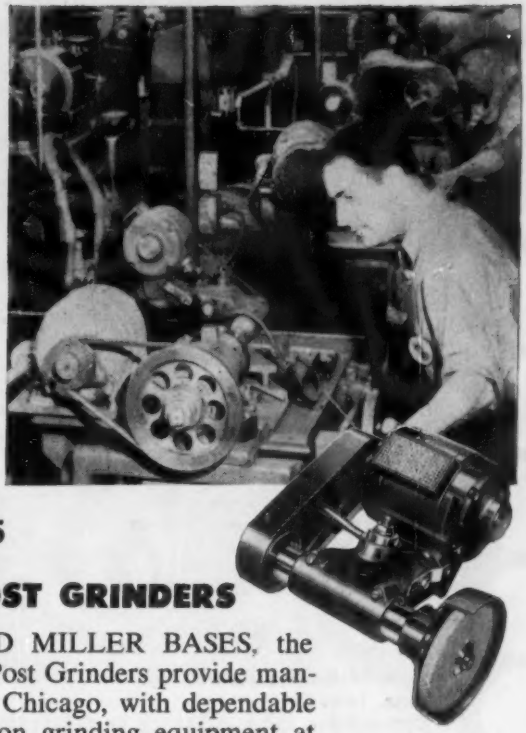

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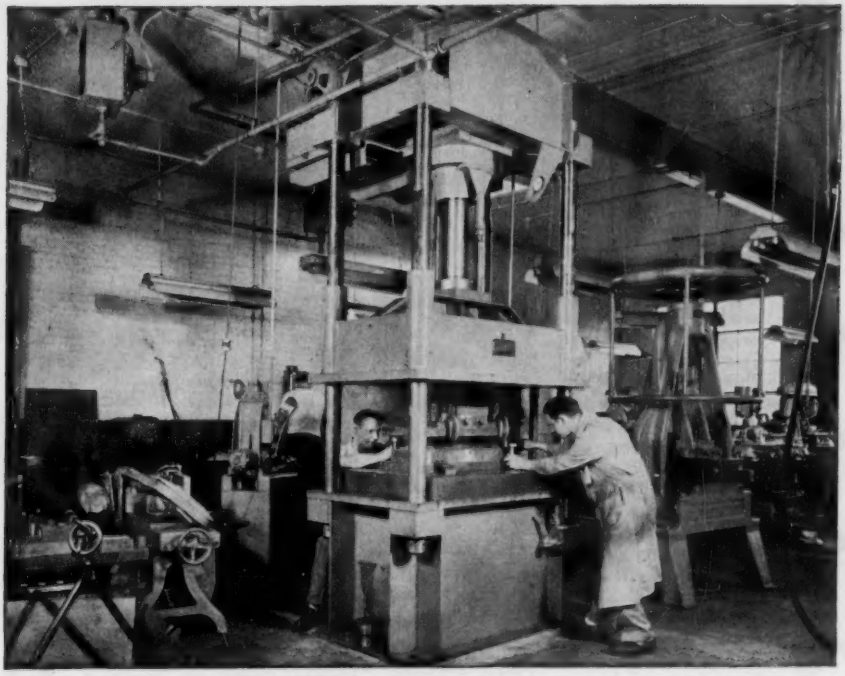

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As in most such shops, his only means of trying out dies was a hand power screw press which sometimes needed six or seven men to get the needed pressure.

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Dake Corporation, 612 Seventh St., Grand Haven, Mich.

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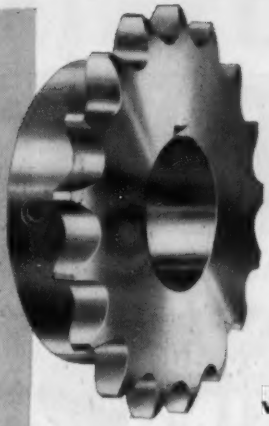

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7124 TRANSMISSION PRODUCTS FROM LOCAL STOCK — AT FACTORY PRICES

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PRODUCTION RECORDS

for large hole tapping!

New heavy duty "TAP KING"

You'll marvel at the speed, power and precision at your finger tips when you operate this remarkable tapping unit. Designed specifically for large hole tapping, in heavy materials, it has repeatedly demonstrated its superiority on many difficult jobs. Here are just a few samples of the kind of work you can expect with the Tap King: "on open hole tapping in carbon steel forgings —production increased 50%"—"on blind tapping in steel castings—production up 100%"—"tapping in 1½" steel plate—a class 2 fit was maintained with ease". The Tap King assures you better finished parts, less spoilage, fewer broken taps, faster, easier operation and greater production. Discover how far you can go in improving **your** tapping operations and reducing costs.

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giving you full details and specifications on this amazing unit.

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heavy duty "TAP KING"

EXCLUSIVE

tru-grip tap holder smaller, lighter, permits tapping close to walls and shoulders.

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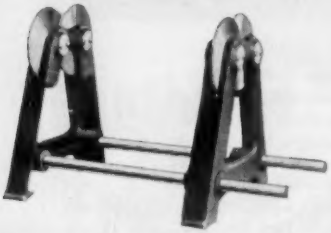
Anderson High Production Tools
CUT PRODUCTION COSTS

Precision Balancing Ways



Balance rotating parts easier, faster, more accurately. No leveling or centering required. Five sizes 20" to 96" swing, 1000 to 20,000 lbs. Precision built with chilled iron discs which rotate with minimum friction on sensitive special bearings.

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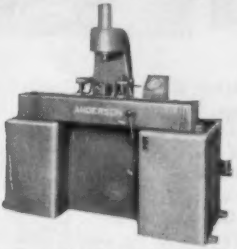
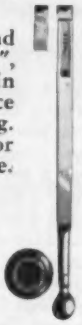


Straighten and check in same location with both speed and accuracy. Available with either traveling or stationary ram, power or hand operated in capacities up to 10, 25, and 50 tons. Can straighten to within .001."

Improved Hand Scrapers

Both high-speed steel and carbide-tipped blades in 18", 20", or 22" lengths. Light in weight, easy to use, reduce need for costly regrinding. Rubber bumper available for comfort and convenience.



Anderson Power Scraper

Power Scraper has a "natural hand control." Forward stroke can be regulated from ¼" to 3½ feet at 60 feet per minute. Portable, may be plugged into any electric outlet.

Anderson

Write for Bulletin No. 13-5

ANDERSON BROS. MFG. CO.

ROCKFORD, ILLINOIS

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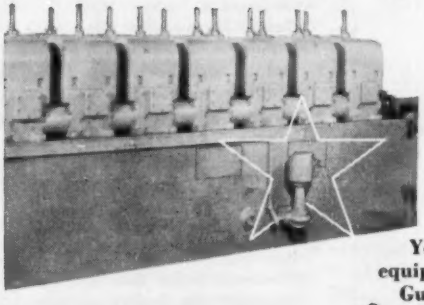
Star Performer
on METAL WORKING machinery

Ruthman Gusher Coolant Pumps

You get instantaneous coolant flow, from trickle to full volume, the moment the machine starts, with a Gusher Coolant Pump. The electronically balanced shaft reduces wear from vibration to a minimum. The pre-lubricated ball bearings require no maintenance attention. From every angle, Ruthman Gusher Coolant Pumps are better.



Illustrated is a Yoder Forming Mill—equipped with a Ruthman Gusher Coolant Pump.

THE RUTHMAN MACHINERY CO.

1817 READING ROAD CINCINNATI 2, OHIO

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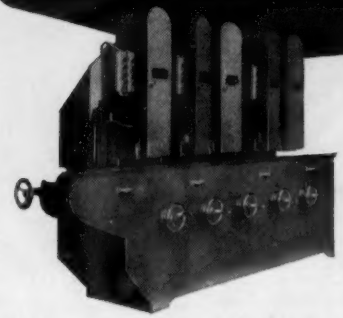
Double Production

by grouping several operations on one

Engelberg Abrasive-Belt Grinder!

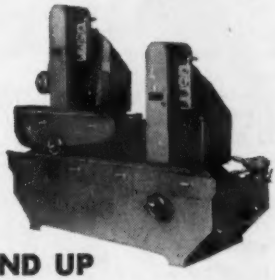


MODEL 680-5 MULTIPLE-HEAD GRINDER Available up to 6 Heads

Single-cycle grouping on 5-headed machine above might include: deburring, flat-surfacing, sizing, polishing and fine polishing. Stock removal is at high speeds. Large grinding area, long belt disperses and dissipates heat. Runs wet or dry.

FOR GRINDING BOTH SIDES OF FLAT WORK

Piece-work first passes under grinding head at left, then is carried around bend to bottom conveyor belt. Unground face is now *up*, positioned for passage under second grinding head at right.



Model 2-1092

PRODUCTION INCREASES OF 100% AND UP

are not uncommon with the high-production semi-automatic abrasive-belt grinders shown here. Fine finishing to close tolerances may be done on *any* ferrous or non-ferrous metal, plastic or other material.

Precision manufacturing of these and scores of other models has provided facilities and experience ideally suited to the solution of problems in abrasive grinding. Our methods-engineers will gladly go over your drawings or samples of typical production pieces for operational analysis—no cost or obligation. Just write.

The ENGELBERG HULLER Co., Inc.
110 Seneca St., Syracuse, N. Y.

ENGELBERG PRECISION ABRASIVE-BELT GRINDERS

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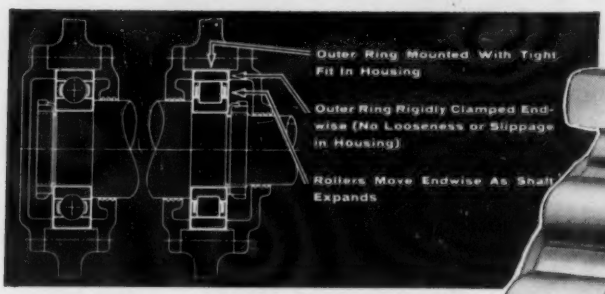
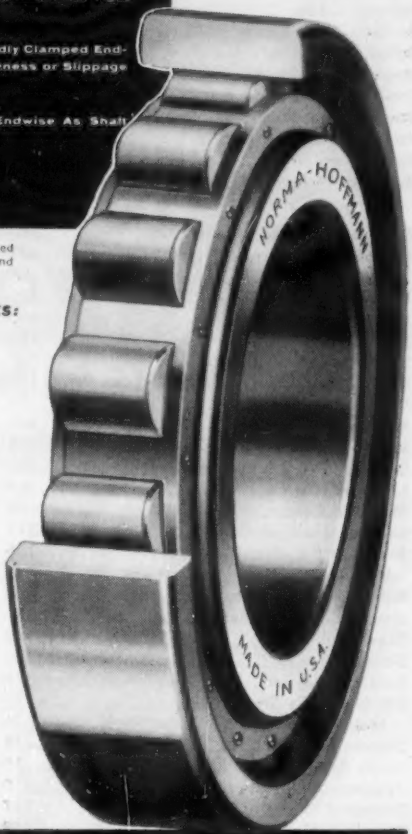
For Shaft Expansion *and/or* Heavy Radial Load

use NORMA-HOFFMANN

Precision Cylindrical Roller Bearings


Outer Ring Mounted With Tight Fit In Housing
Outer Ring Rigidly Clamped Endwise (No Looseness or Slippage in Housing)
Rollers Move Endwise As Shaft Expands

Typical Mounting Using Clamped Ball Bearing At Lightly Loaded End Of Shaft And Clamped Roller Bearing At Heavily Loaded End



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STAMFORD, CONNECTICUT – FOUNDED IN 1911

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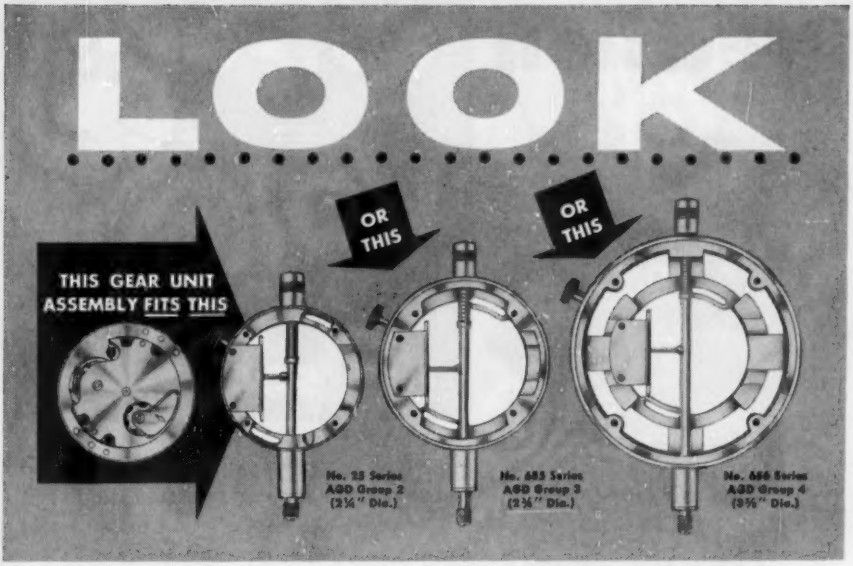
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THIS GEAR UNIT ASSEMBLY FITS THIS
OR THIS
OR THIS
No. 25 Series AGD Group 2 (2¼" Dia.)
No. 655 Series AGD Group 3 (2¾" Dia.)
No. 656 Series AGD Group 4 (3½" Dia.)

SIMPLE INTERCHANGEABLE DESIGN

Makes Starrett HIGH PRECISION LOW FRICTION Dial Indicators *So Easy to Maintain*

(PATENTED)

If you use dial indicators — particularly if you maintain your own repair service — think what this exclusive Starrett feature means to you. Simple Interchangeable Construction means fewer parts to stock, less maintenance time and lower upkeep cost *plus* longer, more accurate life for all your dial indicators.

The entire gear assembly is identical and interchangeable in all comparable models of Starrett No. 25, No. 655 and No. 656 regular and Nonshock indicators. With only two different gear unit assemblies, and by merely changing the combination of gears, 105 different models can be made up with regular mechanism. By changing the case assembly to spindle and rack sleeve, most models can be converted to *Nonshock*.

Simple Interchangeable Construction also means fewer parts and these are heavier and more rigid. Rugged, rigid, simplified design means Starrett Dial Indicators are subject to far less friction and have a longer, more accurate life.

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The L. S. STARRETT COMPANY, Dept. MD
Athol, Massachusetts

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Company.....

Street and Number.....

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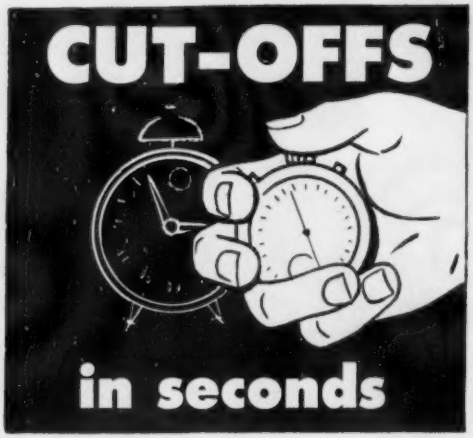
WORLD'S GREATEST TOOLMAKERS

MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS
DIAL INDICATORS • STEEL TAPES • PRECISION GROUND FLAT STOCK
HACKSAWS • HOLE SAWS • BAND SAWS • BAND KNIVES

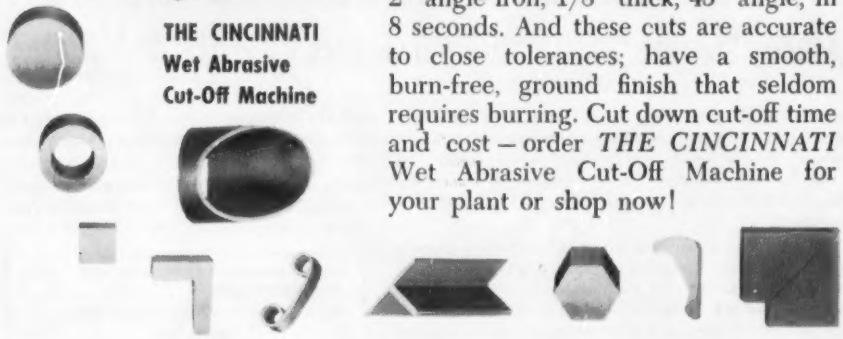
For more data circle 605 on Reader Service Card

Precision CUT-OFFS in seconds



THE CINCINNATI
Wet Abrasive
Cut-Off Machine

Shorten cut-off time from minutes to seconds when you make straight or angle cuts of bar or tube stock. For example, cut 2″ bar stock in 15 seconds; 2″ tubing, 3/32″ wall, in 10 seconds; 2″ angle iron, 1/8″ thick, 45° angle, in 8 seconds. And these cuts are accurate to close tolerances; have a smooth, burn-free, ground finish that seldom requires burring. Cut down cut-off time and cost – order *THE CINCINNATI* Wet Abrasive Cut-Off Machine for your plant or shop now!



For complete details on this machine and our complete line of Grinders, Buffers, Speed Lathes and Dust Collectors, write for Catalog 56 CA.

The CINCINNATI ELECTRICAL TOOL CO.

Division of The R. K. LeBlond Machine Tool Co.

2692 MADISON ROAD, CINCINNATI 8, OHIO

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↓Use this Reader Service Card for requesting more information on products described and advertised↓

READER SERVICE CARD **November 1956 Issue** GOOD UNTIL JANUARY 1, 1957

Your Name_____ Your Title_____

Company Name_____

Company Address_____

City_____ Zone_____ State_____

Products Manufactured_____ Number of Plant Employees_____

modern machine shop

431 Main Street
Cincinnati 2, Ohio

Circle KEY numbers (NOT PAGE NUMBERS) for more information on items described or advertised in this issue.

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BOX 74
VILLAGE STATION
NEW YORK 14, NEW YORK

NOW...YOUR SMALL SHEAR PROBLEM SOLVED!

ALL NEW Lodge & Shipley 24" speed shear

...GIVES POWER SHEARING AT PRODUCTION RATES AND LOWEST COST!

NEW SPEED, VERSATILITY AND CONVENIENCE FOR

- straight & angle shearing
- sequence shearing
- slitting • notching • blanking
- duplicating without dies

There's no need to tie up large shears or use makeshift methods for shearing small pieces. The all-new Lodge & Shipley 24" SPEED SHEAR is designed for fast, low-cost, accurate shearing operations.

Capacity . . . 1/8" in mild steel
Speed . . . 120 strokes/minute
Size . . . 72" high, 50" wide and deep
Throat Depth . . . 10-1/4"

The SPEED SHEAR can be used for straight shearing with the front adjusted back gauge. By using the large "End-Around" work table that is provided with numerous tapped holes, protractors, clamps and gauges can be quickly and accurately set up for duplica.ing or sequence shearing.

The 24" SPEED SHEAR is complete, ready to go to work anywhere in your plant. Ruggedly built of solid rolled steel plate, it is light in weight; floor loading is no problem. Ease of operation makes it ideal for women operators.

Lodge & Shipley

For small shearing too . . .
your Lodge-ical choice!

NEW LITERATURE AVAILABLE . . .
write today for Bulletin No. SS-24
Address: The Lodge & Shipley Co.,
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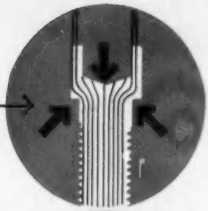
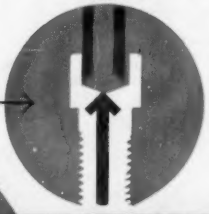
FOR MORE DATA CIRCLE "THIRD COVER" ON READER SERVICE CARD

HOLO-KROME SOCKETS COMPLETELY FORGED!



Metal fibers stay intact for greatest strength. No drilling, cutting, broaching to weaken socket walls.

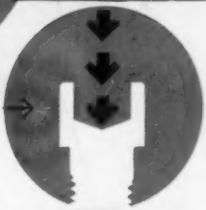
NO WALL TAPER IN HOLO-KROME SOCKETS!



Hex key bears evenly against smooth untapered walls. The results: easier, faster assembly . . . longer key life . . . fewer damaged screws!

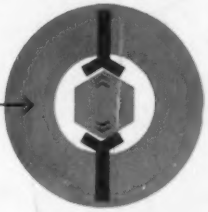
The secret's in the socket of H-K cap and set screws

H-K CONTROLS SOCKET DEPTH FOR TOUGHER SCREWS!



Sockets are formed deep enough for hex key to get a firm, solid bite . . . yet scientifically proportioned to give maximum strength to the screw head.

H-K's SHARP SOCKET CORNERS RESIST REAMING!



The hex key fits better, bears evenly under pressure, gets a solid grip for positive fastening.

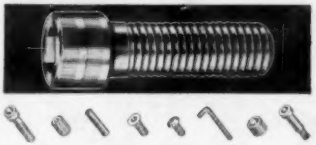
IT TAKES 26 YEARS OF SKILL, EXPERIENCE AND KNOW-HOW TO TURN OUT A HOLO-KROME SOCKET SCREW!

HK

FOR THE FINEST IN SOCKET SCREWS . . . FOR UNMATCHED SAME-DAY SERVICE . . . THE NAME TO REMEMBER IS

HOLO-KROME

THE HOLO-KROME SCREW CORP., HARTFORD 10, CONN.



For more data circle "Fourth Cover" on Reader Service Card